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The Y-DNA Genetic Signature and Ethnic Origin of the Katzenellenbogen Rabbinical Lineage [AB-033]

FILED UNDER AB-033 J1-L817-L816, AB-033 J1-ZS2756, COLLABORATION, DNA STUDIES, EUROPE - EASTERN, EUROPE - WESTERN, RABBINIC GENEALOGY, SEFARDIM BY JEFFREY MARK PAULL, NEIL ROSENSTEIN AND JEFFREY BRISKMAN ON MARCH 7, 2016

Introduction

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According to Arthur Kurzweil: "For the Jewish people, our royal families have been those of the illustrious rabbis."[1] If that is true, then the Katzenellenbogen rabbinical lineage is foremost among these noble families. For centuries, Jewish men and women have sought to connect themselves and their descendants to this renowned family, either through marriage, or by paper trail. Now, thanks to recent advances in genetic genealogy, this may be possible to do for many more individuals of Jewish descent than ever before.

The Katzenellenbogen rabbinic lineage, which descends from Rabbi Meir *ben* (son of) Rabbi Isaac Katzenellenbogen, better known as the Maharam of Padua (c. 1482–1565), is a venerable family with many tens of thousands of descendants widely dispersed throughout Eastern and Central Europe, as well as Israel and the United States.[2] The family derived its name from the locality of Katzenelnbogen in the Prussian province of Hesse-Nassau, now Germany.[3] [4]

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The Katzenellenbogen lineage produced a long line of distinguished rabbis and notable personalities over the centuries and is tightly interwoven with many of the most renowned Ashkenazi rabbinic families of Europe. The family was widely dispersed, but its unity was maintained through meticulously kept family records. Thanks to the genealogical research efforts of our co-author, Dr. Neil Rosenstein, in locating, translating, and compiling the abundant source material in his book, *The Unbroken Chain*, the genealogical information on the Katzenellenbogen lineage is extensive and highly accessible.[5]

The Katzenellenbogen rabbinical lineage is a particularly noteworthy lineage from a genealogical research perspective, due to its many marriage connections to other iconic rabbinical lineages and dynasties throughout Europe and the Russian Empire, its large number of descendants, and its well-documented paper trail.[6] [7] Members of the family intermarried with other prominent Jewish families and produced many notable rabbis. Such was the fame of the Katzenellenbogen family that men who married Katzenellenbogen women typically adopted their wives' family surname[8] (see the Appendix for additional information regarding the Katzenellenbogen rabbinical lineage).

Thanks to the numerous published genealogies of the Katzenellenbogen family in rabbinical sources, family trees, and *yichus* letters, genealogists have reached a consensus regarding the authenticity and validity of the Katzenellenbogen rabbinical lineage.[9] [10]

The ancestral links and connections from Rashi to Rabbi Meir Katzenellenbogen are summarized in Figure 1.[11] Figures 2 and 3 take a closer look at Rabbi Meir Katzenellenbogen's paternal descendants, from 1482 to the present. The ancestral links and connections summarized in Figures 1, 2, and 3 below will assist descendants of the Katzenellenbogen rabbinical lineage in tracing their ancestry.

FIGURE 1: DESCENT OF THE KATZENELLENBOGEN RABBINICAL LINEAGE FROM RASHI

FIGURE 2: THE KATZENELLENBOGEN RABBINICAL LINEAGE, DESCENDING FROM RABBI MEIR KATZENELLENBOGEN

FIGURE 3: THE KATZENELLENBOGEN RABBINICAL LINEAGE, DESCENDING FROM RABBI MOSES KATZENELLENBOGEN

Identifying Pedigreed Descendants of the Katzenellenbogen Rabbinical Lineage

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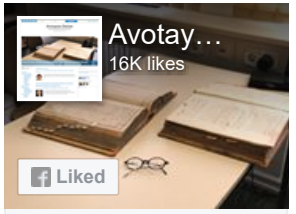

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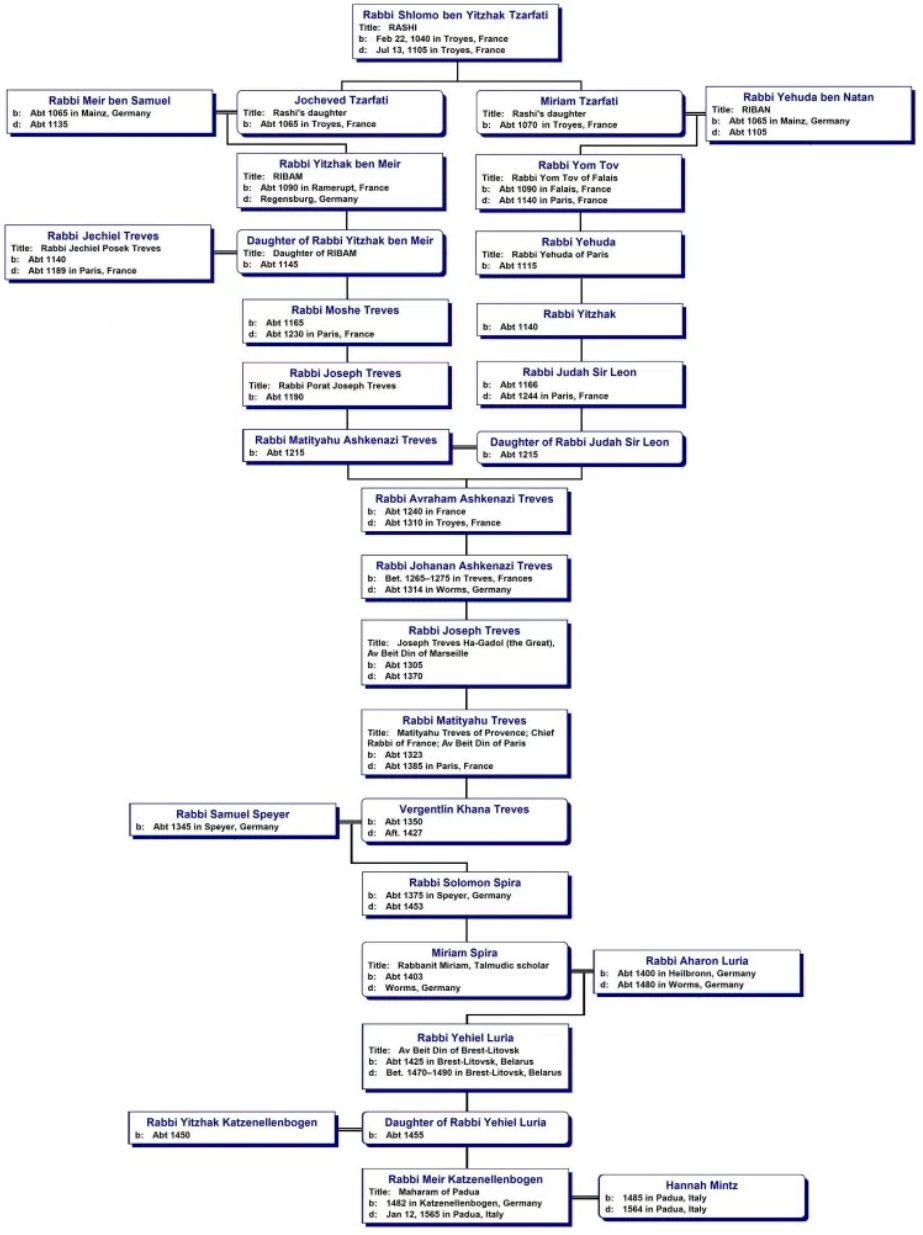

Genetic tests, including Y-DNA tests, are not an easy substitute for traditional genealogical research, and a substantial knowledge of the genealogical background is required before Y-DNA tests can make a significant contribution.[12]

@RandySchoenberg

TOMORROW, Sunday, June 25 at 1:00 pm (note special time): Docent-led tour of Museum. The tour is free and open to... fb.me/5mNjRCISe

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Karen Franklin lecturing today at JGSNY: "DNA Leads An Adopted Daughter to her Birth Mother: Kelly's Story at CJH.

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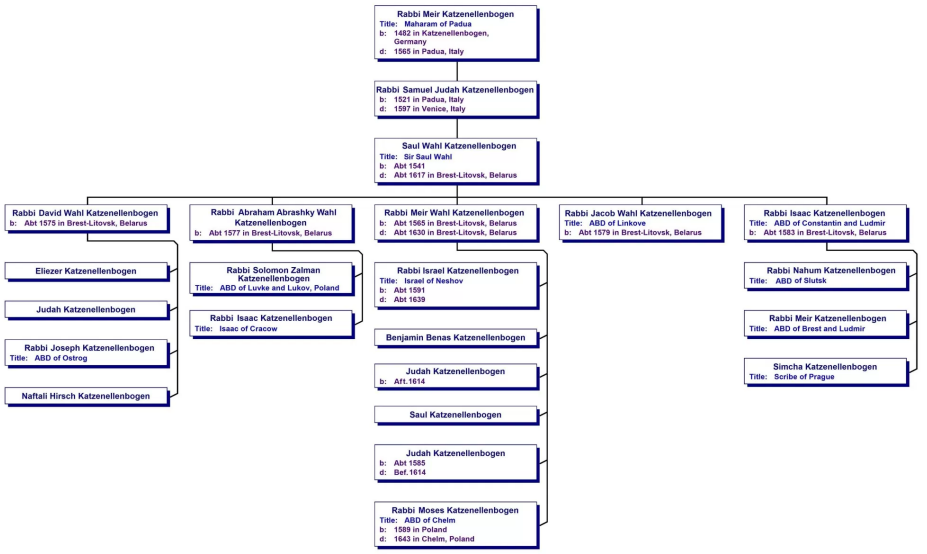

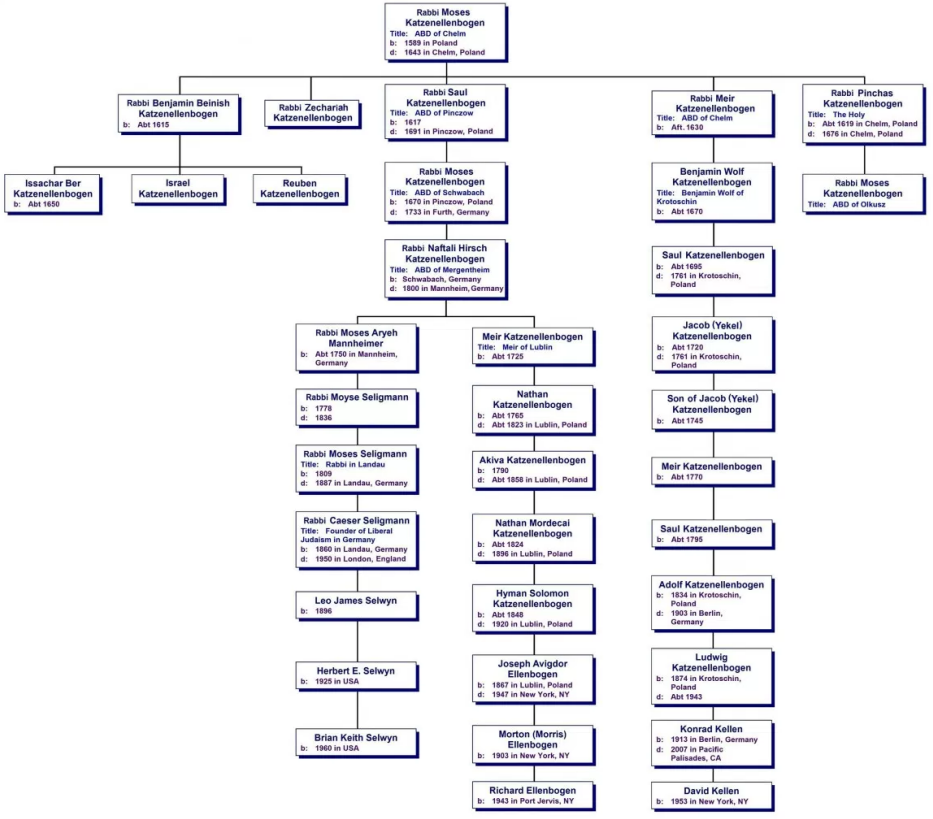

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The Katzenellenbogen lineage extends over five centuries, but lines with living paternal descendants, descending solely from father-to-son, are rare, and locating and testing them presents unique genealogical challenges. Extensive genealogical research of the Katzenellenbogen family conducted by Dr. Neil Rosenstein, culminating in the publication of *The Unbroken Chain*,[13] laid the necessary groundwork for identification of living descendants for this Y-DNA study.

From the hundreds of lineages documented in his book, Dr. Rosenstein selected seven candidate paternal lines for which he had preliminary information linking them to living descendants: Ellenbogen, Green, Katzenellenbogen, Leiner, Mintz, Riesser, and Selwyn. An eighth candidate line, for Kellen, was discovered through additional genealogical research conducted by study authors Paull and Briskman.

Unfortunately, living descendants could not be located for the Green, Leiner, or Riesser paternal lines, and the sole living descendant of the only paternal line that still bears the Katzenellenbogen surname, declined to take a Y-DNA test. This left the research team with four viable candidate lineages for Y-DNA testing, represented by the Ellenbogen, Kellen, Mintz, and Selwyn lines.

Dr. Richard Ellenbogen (b. 1943) represents the **Ellenbogen** paternal line, which descends from Saul Wahl Katzenellenbogen (c. 1541 – 1617) through his son, Rabbi Meir Katzenellenbogen (c. 1565 – 1630). Rabbi Meir's grandson was Rabbi Saul Katzenellenbogen (1617 – 1691), and Rabbi Saul's son was Moses Katzenellenbogen (1670 – 1733). Richard Ellenbogen is descended from Moses Katzenellenbogen through Moses' son Rabbi Naftali Hirsch Katzenellenbogen (d. 1800) and his son Meir Katzenellenbogen (b. circa 1725).

Brian Keith Selwyn (b. 1960) represents the **Selwyn** paternal line, which descends from Saul Wahl Katzenellenbogen (c. 1541 – 1617) through the same lineage as Richard Ellenbogen, but through a different son of Rabbi Naftali Hirsch Katzenellenbogen, Moses Aryeh Mannheimer (b. 1750).

David Kellen (b. 1953) represents the **Kellen** paternal line, which descends from Saul Wahl Katzenellenbogen (c. 1541 – 1617) through the same lineage as Richard Ellenbogen, but through a different grandson of R. Meir Katzenellenbogen (1565 – 1630), R. Meir Katzenellenbogen (born after 1630), and named after his grandfather.[14] The paternal lines of descent for these three verified Katzenellenbogen descendants are presented in Figures 2 and 3, and are summarized in Table 1.[15]

A descendant representing the **Mintz** paternal line that descends from Saul Wahl Katzenellenbogen through his grandson, Rabbi Nachum Katzenellenbogen, ABD of Slutsk, was also located.[16] However, several sources mention Rabbi Nachum of Slutsk as

Nu? What's New?
The E-zine of Jewish Genealogy From Avotaynu

Gary Mokotoff, Editor

Volume 16, Number 2 | January 11, 2015

Every government puts value on preserving its history. That is why we have national archives. Genealogy preserves history; the history of a family. It cannot be done without access to records, just as historians cannot preserve a nation's history without access to records. It is a greater good than the right to privacy. It is a greater good than the risk of identity theft.

Past issues of *Nu? What's New?* are archived at http://www.avotaynu.com/nu.htm

New Guide to Salt Lake City

Planning a trip to Salt Lake City to do research at the Family History Library? Yet another book has been written about how to make the trip a success—with a twist. The book does not discuss any aspect of the Library but instead focuses on all the other considerations for making a trip to that city a pleasant experience.

Written by Janet Havorka, who calls herself the Chart Chick, the 24-page PDF file describes lodging, transportation (getting around), the beautiful Wasatch Mountains, where to eat, other libraries and archives in the Salt Lake City area, historical sites, religious institutions (noting two synagogues), shopping (with emphasis on the City Creek Center), parks, weather, potential day trips. There is a section on "Bringing the Family" which describes how to keep your family busy and happy while you do research.

The title of the book is *The Chart Chick Insider's Guide to Salt Lake City: Everything a Genealogist Needs to Know Outside the Library*. Download the book (PDF format) at no charge at http://www.familychartmasters.com/slc/. Registration is required. There is also a printed version sold for $14.95 at http://www.familychartmasters.com/slc/ccd.html.

FamilySearch Indexing Projects

For those anxious to know what will be the next indexing projects to be completed by FamilySearch and what other projects are in the planning stage, you can find a list at the FamilySearch site at https://familysearch.org/node/2492.

Reminder: *Genealogy Roadshow* first program January 13

Genealogy Roadshow will start its new season on PBS channels this Tuesday, January 13 at 8pm. A takeoff on the program *Antiques Roadshow*, it features Kenyatta D. Berry, Joshua Taylor and Mary Tedesco solving specific genealogy problems of the participants who have unique claims and storylines. Examples are a woman seeking to find out if she is descended from the infamous pirate Blackbeard; and a pair of sisters exploring connections to a survivor of the legendary Donner party. The show's website is at http://www.pbs.org/genealogy-roadshow/home/.

Webinar: Introduction to Library of Congress Online Resources

The U.S. Library of Congress will be holding its regular webinar—an introduction to its online resources—on a number of days in January-February. This orientation will provide an overview of what is available, provide strategies for accessing the materials, and introduce the participant to the resources created by its staff to further research into the Library's collections.

Dates/times are: January 13, 11am; January 21, 3 pm; February 18, 11 am; and February 24, 2:30 pm. All times shown are Eastern time. The webinar lasts for an hour. Registration is at http://www.loc.gov/rr/program/orientation_form.php.

The Library of Congress is the largest library in the world, with more than 158 million items—including books, recordings, photographs, maps, sheet music, manuscripts—in its collections.

Index to South Africa Voter Lists on Ancestry.com

Ancestry.com now has voter indexes from South Africa from 1719–1996. There are about 220,000 names. Because of the wide range of years, information about an individual varies but typically includes name, place of residence and occupation. When searching for a specific person (Hyam Levy) in the Ancestry.com general search, this database was not yet included. The index

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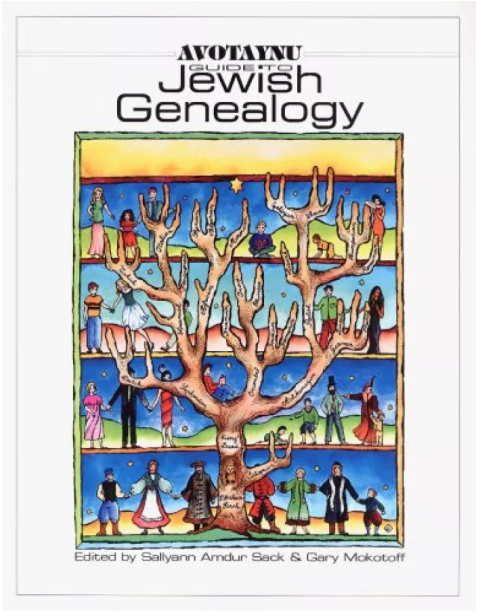


either the son *or* the son-in-law of Saul Wahl's son Meir,[17] [18] and based on genealogical research conducted since his original publication of *The Unbroken Chain*, in 1990, Dr. Rosenstein believes him to be a maternal descendant.[19] Due to this uncertainty, the Mintz descendant was not included in Table 1.

TABLE 1: Paternal Line of Descent for Pedigreed Descendants of the Katzenellenbogen Rabbinical Lineage

In addition to the three pedigreed Katzenellenbogen paternal descendants, the authors located two additional descendants having an oral history of descent from the Katzenellenbogen lineage: Graham De Vahl Davis (b. 1931), and Viktor Katsenelenbogen (b. 1936).

Graham De Vahl Davis's paternal ancestor Woolf Davis (1828 – 1902) was born as Zeev Katzenellenbogen, in Poland. In addition to having the Katzenellenbogen surname, the family has an oral history of descent from the Katzenellenbogen lineage.[20]

Viktor Katsenelenbogen's grandfather was Abel Katsenelenbogen (c. 1870 – 1941). Abel's father was the main rabbi of a synagogue in Bucharest, Romania. According to family oral history, the family originated in Spain, from where they immigrated to Germany.[21] The family had an oral history of descent from a "famous rabbinical line."

Methods

The Y-DNA tests were conducted by Family Tree DNA (FTDNA) of Houston, Texas. The standard DNA Y-chromosome segment (DYS) markers, also referred to in genetic testing as short-tandem repeat or STR markers, for the three pedigreed Katzenellenbogen paternal descendants, three partially documented descendants, and nine newly-identified genetic matches of the pedigreed Katzenellenbogen descendants, are presented in Tables 2, 3, and 4.

The value of testing Y-DNA STR markers comes from creating a Y-DNA signature (haplotype) with them and comparing that Y-DNA signature to others in a database. They are useful for genetic genealogy because a unique Y-DNA signature distinguishes one paternal lineage from another. They can then be used in conjunction with Family Tree DNA's Y-DNA comparative database to discover genealogical connections or historic ancestry.[22]

Y-DNA mutates very slowly, and passes down from father-to-son without recombination,

GENERATION	PEDIGREE OF DOCUMENTED KATZENELLENBOGEN PATERNAL DESCENDANTS		
1	Rabbi Meir KATZENELLENBOGEN 1482 – 1565		
2	Rabbi Samuel Judah KATZENELLENBOGEN 1521 – 1597		
3	Saul Wahl KATZENELLENBOGEN c. 1541 – 1617		
4	Rabbi Meir KATZENELLENBOGEN c. 1565 – 1630		
5	Rabbi Moses KATZENELLENBOGEN 1589 – 1643		
6	Rabbi Saul KATZENELLENBOGEN 1617 – 1691		Rabbi Meir KATZENELLENBOGEN Aft. 1630
7	Moses KATZENELLENBOGEN 1670 – 1733		Rabbi Benjamin Wolf KATZENELLENBOGEN c. 1670
8	Rabbi Naftali Hirsch KATZENELLENBOGEN d. 1800		Saul KATZENELLENBOGEN c. 1695 – 1761
9	Meir KATZENELLENBOGEN c. 1725	Rabbi Moses Aryeh MANNHEIMER (Katzenellenbogen) c. 1750	Jacob (Yekel) KATZENELLENBOGEN c. 1720 – 1761
10	Nathan KATZENELLENBOGEN c. 1765 – 1823	Rabbi Moyse SELIGMANN (Chaim Pinchas Mannheimer) 1778 – 1836	Son of Jacob KATZENELLENBOGEN c. 1745
11	Akiva KATZENELLENBOGEN 1790 – c. 1858	Rabbi Moses SELIGMANN 1809 – 1887	Meir KATZENELLENBOGEN c. 1770
12	Nathan Mordecai KATZENELLENBOGEN c. 1824 – 1896	Rabbi Caeser (Chaim Pinchas) SELIGMANN 1860 – 1950	Saul KATZENELLENBOGEN c. 1795
13	Hyman Solomon KATZENELLENBOGEN 1848 – 1920	Leo James SELWYN (Seligmann) 1896 – 1989	Adolf (Eisig) KATZENELLENBOGEN 1834 – 1903
14	Joseph Avigdor ELLENBOGEN (Katzenellenbogen) 1867 – 1947	Herbert E. SELWYN b. 1925	Ludwig KATZENELLENBOGEN 1874 – 1943
15	Morton ELLENBOGEN 1903 – 1978	Brian Keith **SELWYN** b. 1960	Konrad KELLEN (Katzenellenbogen) 1913 – 2007
16	Richard **ELLENBOGEN** b. 1943		David **KELLEN** b. 1953

except for the rare mutations that occur along the hereditary line, which is why the Y-DNA genetic signature of a male descendant represents that of his entire paternal lineage.[23] For the purpose of Y-DNA testing, it is essential that all descendants of the studied lineage are son-after-son. If there is even one maternal ancestor interposed in the lineage, the Y-DNA results of the descendants will not reflect the Y-DNA genetic signature of their common paternal ancestor.

In order to establish the Y-DNA genetic signature of a particular common paternal ancestor, the Y-DNA of descendants of that paternal ancestor must genetically match one

another. Ideally, these descendants should be from at least two different sons of that common ancestor, with each descendant representing a different cousinly paternal line. Matching Y-DNA results from three or more different paternal lines provides additional confirmation and validation of the Y-DNA genetic signature.

Y-DNA tests of the three pedigreed Katzenellenbogen paternal descendants were reported at the 67 STR marker level. Y-DNA tests of partially documented paternal descendants were initially reported at the 37 STR marker level. If their allele values were found to match those of pedigreed descendants, their Y-DNA tests were upgraded to 67 STR markers.

Four Jewish genetic matches and five Iberian genetic matches to the pedigreed Katzenellenbogen descendants were identified from their genetic match lists, and they accepted invitations to join our FTDNA Katzenellenbogen Y-DNA project. All were listed as close genetic matches to the pedigreed descendants; each had a minimum of Y-DNA 67 STR markers tested, and most also had additional single nucleotide polymorphism (SNP) genotyping to further refine their initial haplogroup classification.[24]

Y-DNA Test Results

Table 2 presents the Y-DNA test results for both pedigreed and partially documented Katzenellenbogen paternal descendants. The three Katzenellenbogen descendants for whom there are complete paper trails which clearly and explicitly document paternal pedigree are: Richard Ellenbogen, David Kellen, and Brian Selwyn. All three pedigreed Katzenellenbogen descendants agreed to take a Y-DNA test.

Table 2 also presents the Y-DNA test results for the three Katzenellenbogen descendants for which the evidence of paternal pedigree is equivocal, due to either incomplete paper trails, ambiguities in their paternal pedigree, or the absence of archival records. These three descendants include Viktor Katsenelenbogen, Graham de Vahl Davis, and the Mintz descendant.

The Y-DNA results showed a very close genetic match between all three of the pedigreed Katzenellenbogen descendants, Richard Ellenbogen, David Kellen, and Brian Selwyn. They matched one another on 66/67 STR markers. Each of them had one non-matching allele value, representing a possible mutation out of the 67 STR marker locations tested. The 64 of 67 STR markers at which the three pedigreed Katzenellenbogen descendants' allele values identically match represent ancestral values.

With only three pedigreed descendants, it is not possible to determine whether the single non-matching allele value represents a mutation or an ancestral value; hence, these

idiosyncratic allele values are considered as "possible ancestral allele values" (indicated by the green shaded cells in Table 2).

A Y-DNA SNP test identified all three pedigreed descendants as belonging to the J-M267 haplogroup, of which the terminal J-L823 SNP is a subclade (see Discussion of the J-M267 / J-L823 Haplogroup). This haplogroup designation, together with the Y-DNA 67 STR marker allele values (haplotype), comprises the genetic signature for the Katzenellenbogen rabbinical lineage.[25]

The Y-DNA test results also showed a genetic match between Viktor Katsenelenbogen and the three pedigreed Katzenellenbogen descendants. He was a 60/67 marker match to Richard Ellenbogen, David Kellen, and Brian Selwyn. His seven non-matching allele values represent probable allele mutations (indicated by the blue shaded cells in Table 2). Viktor also belongs to the same J-L823 subclade of the J-M267 haplogroup as do all three pedigreed Katzenellenbogen descendants.

These results, coupled with his surname, and his family's oral history of rabbinical descent, [26] indicate that Viktor Katsenelenbogen is most likely a descendant of the Katzenellenbogen rabbinical lineage, although it is also possible that his common ancestor predates the progenitor of the rabbinical line (see Time-to-Most Recent Common Ancestor Predictions).

TABLE 2: Y-DNA Test Results for Descendants of the Katzenellenbogen Rabbinical Lineage

In contrast to these matching Y-DNA results, Graham de Vahl Davis matched the three pedigreed Katzenellenbogen descendants on only 10 of 37 STR marker locations, and he belongs to a completely different (R-M269) haplogroup. The descendant from the Mintz line also matched the other three pedigreed descendants on only 10 of 37 STR marker locations, and he, too, belongs to a completely different (E-M2) haplogroup.

These widely disparate Y-DNA results effectively rule out paternal descent from the Katzenellenbogen rabbinical lineage for these two individuals. In the case of the Mintz line, these results were anticipated, since, as previously discussed, their descent from the Katzenellenbogen lineage was suspected of passing through a maternal Katzenellenbogen ancestor, Rabbi Nachum of Slutsk. In the case of the de Vahl Davis line, it is difficult to know where the disruption in the paternal lineage occurred, as the lineage is only partially documented. It is quite possible that the de Vahl Davis line, like the Mintz line, passes through a maternal Katzenellenbogen ancestor.

Nine newly-discovered Y-DNA genetic matches were identified from the genetic match lists of the pedigreed Katzenellenbogen paternal descendants. They fell into two different

Y-DNA STR MARKER	Pedigreed Katzenellenbogen Paternal Descendants			Descendants with Oral History or Uncertain Pedigree		
	Richard Ellenbogen	David Kellen	Brian Selwyn	Viktor Katsenelenbogen	Graham de Vahl Davis	Mintz Descendant
DYS393	12	12	12	12	13	13
DYS390	23	23	23	23	23	24
DYS19	14	14	14	14	14	14
DYS391	10	10	10	10	11	10
DYS385	14-17	14-17	14-17	14-17	12-13	14-16
DYS426	11	11	11	11	12	12
DYS388	15	15	15	16	13	12
DYS439	12	12	12	12	12	13
DYS389I	13	13	13	13	13	14
DYS392	11	11	11	11	13	11
DYS389II	29	29	29	29	29	32
DYS458	17	17	17	17	15	16
DYS459	8-8	8-8	8-8	8-8	9-9	9-9
DYS455	11	11	11	11	11	11
DYS454	11	11	11	11	11	11
DYS447	25	25	25	25	25	26
DYS437	14	14	14	14	15	15
DYS448	20	20	20	20	18	20
DYS449	25	25	25	25	28	33
DYS464	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	13-14-14-16	16-16-16-17-17-17
DYS460	11	11	11	11	11	11
Y-GATA-H4	10	10	10	10	11	10
YCAII	21-22	21-22	21-22	21-22	18-23	21-22
DYS456	15	15	15	16	15	16
DYS607	14	14	14	14	17	12
DYS576	19	19	19	18	20	18
DYS570	18	18	17	18	15	18
CDY	31-31	31-31	31-31	31-31	36-40	32-34
DYS442	13	13	13	12	14	12
DYS438	10	10	10	10	11	10
DYS531	11	11	11	11		
DYS578	8	8	8	8		
DYF395S1	15-16	15-16	15-16	15-16		
DYS590	8	8	8	8		
DYS537	11	11	11	11		
DYS641	11	11	11	11		
DYS472	8	8	8	8		
DYF406S1	11	11	11	11		
DYS511	9	9	9	9		
DYS425	12	12	12	12		
DYS413	21-22	21-22	21-22	21-22		
DYS557	18	19	19	19		
DYS594	10	10	10	10		
DYS436	12	12	12	12		
DYS490	12	12	12	12		
DYS534	18	17	18	16		
DYS450	8	8	8	8		
DYS444	13	13	13	13		
DYS481	25	25	25	25		
DYS520	21	21	21	20		
DYS446	14	14	14	14		
DYS617	12	12	12	12		
DYS568	11	11	11	11		
DYS487	13	13	13	13		
DYS572	12	12	12	11		
DYS640	12	12	12	12		
DYS492	12	12	12	12		
DYS565	11	11	11	11		
HAPLOGROUP	J-L823	J-L823	J-L823	J-L823	R-M269	E-M2

groups consisting of four Jewish, and five Iberian genetic matches.

Table 3 presents the Y-DNA STR marker results for the four newly-identified Jewish Katzenellenbogen genetic matches (KGMs) to the pedigreed Katzenellenbogen paternal descendants. The closeness of their Y-DNA genetic match varied from 63 of 67 allele values for Richard Dahl and Samuel Gelfand, and 64 of 67 allele values for Bennett

Greenspan, to 65 of 67 allele values for Marvin Zaveloff. They also belong to the same J-L823 subclade of the J-M267 haplogroup.

An interesting aspect of the Y-DNA results for the newly-identified Jewish KGMs, is that all four of them displayed the same differences from the pedigreed Katzenellenbogen descendants' ancestral allele values at the same two STR marker locations (DYS388 and DYS576), signifying that probable mutations had occurred in their line at these two marker locations (denoted by the blue shaded cells in Table 2).

At three other marker locations (DYS570, DYS557, and DYS534), the Jewish KGMs shared matching allele values with either one or two of the three pedigreed Katzenellenbogen descendants. These allele values (denoted by the green shaded cells in Table 2) may represent mutations, but they may also represent ancestral allele values; additional research will be need to distinguish between these two possibilities. Two of the newly-identified Jewish KGMs also displayed a probable mutation at marker location DYS446.

TABLE 3: Comparison of Y-DNA67 Results between Pedigreed Katzenellenbogen Paternal Descendants and Newly-Identified Jewish Genetic Matches

Table 4 presents the Y-DNA STR marker results for five Iberian Katzenellenbogen genetic matches (KGMs) to the verified Katzenellenbogen paternal descendants.[27] They were identified based upon their appearance on the genetic match list of all three pedigreed Katzenellenbogen descendants. All five belong to the J-M267 haplogroup; two have had additional SNP testing, and belong to the J-L823 subclade of the J-M267 haplogroup.

The closeness of the Iberian KGMs genetic match to the haplotype[28] of the three pedigreed Katzenellenbogen descendants varied from 61 of 67 allele values for Gilbert Marquez, 62 of 67 allele values for Xico Garcia and Manuel Tenorio, and 63 of 67 allele values for Rodolfo Echeverria Dominguez and Eddy Romero.

An interesting aspect of the Y-DNA results for the newly-identified Iberian KGMs is that several of their mutations were identical to those of the newly-identified Jewish KGMs. In particular, all five Iberian KGMs displayed the same mutation at STR marker location DYS388 and four of them displayed the same mutation at DYS576. In addition, all five Iberian KGMs displayed a mutation at STR marker location DYS444.

All five newly-identified Iberian KGMs were initially classified as belonging to the J-M267 haplogroup, as were the three pedigreed Katzenellenbogen descendants. They have since been reclassified as belonging to either the J-YSC0000076 or the J-L823 subclade of the J-M267 haplogroup based upon the results of additional SNP testing.[29]

Y-DNA STR Marker	Pedigreed Katzenellenbogen Paternal Descendants			Newly-Identified Jewish Katzenellenbogen Genetic Matches			
	Richard Ellenbogen	David Kellen	Brian Selwyn	Richard Dahl	Samuel Gelfand	Bennett Greenspan	Marvin Zaveloff
DYS393	12	12	12	12	12	12	12
DYS390	23	23	23	23	23	23	23
DYS19	14	14	14	14	14	14	14
DYS391	10	10	10	10	10	10	10
DYS385	14-17	14-17	14-17	14-17	14-17	14-17	14-17
DYS426	11	11	11	11	11	11	11
DYS388	15	15	15	17	17	17	17
DYS439	12	12	12	12	12	12	12
DYS389I	13	13	13	13	13	13	13
DYS392	11	11	11	11	11	11	11
DYS389II	29	29	29	29	29	29	29
DYS458	17	17	17	17	17	17	17
DYS459	8-8	8-8	8-8	8-8	8-8	8-8	8-8
DYS455	11	11	11	11	11	11	11
DYS454	11	11	11	11	11	11	11
DYS447	25	25	25	25	25	25	25
DYS437	14	14	14	14	14	14	14
DYS448	20	20	20	20	20	20	20
DYS449	25	25	25	25	25	25	25
DYS464	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16
DYS460	11	11	11	11	11	11	11
Y-GATA-H4	10	10	10	10	10	10	10
YCAII	21-22	21-22	21-22	21-22	21-22	21-22	21-22
DYS456	15	15	15	15	15	15	15
DYS607	14	14	14	14	14	14	14
DYS576	19	19	19	18	18	18	18
DYS570	18	18	17	18	18	18	18
CDY	31-31	31-31	31-31	31-31	31-31	31-31	31-31
DYS442	13	13	13	12	13	13	13
DYS438	10	10	10	10	10	10	10
DYS531	11	11	11	11	11	11	11
DYS578	8	8	8	8	8	8	8
DYF395S1	15-16	15-16	15-16	15-16	15-16	15-16	15-16
DYS590	8	8	8	8	8	8	8
DYS537	11	11	11	11	11	11	11
DYS641	11	11	11	11	11	11	11
DYS472	8	8	8	8	8	8	8
DYF406S1	11	11	11	11	11	11	11
DYS511	9	9	9	9	9	9	9
DYS425	12	12	12	12	12	12	12
DYS413	21-22	21-22	21-22	21-22	21-22	21-22	21-22
DYS557	18	19	19	19	19	19	19
DYS594	10	10	10	10	10	10	10
DYS436	12	12	12	12	12	12	12
DYS490	12	12	12	12	12	12	12
DYS534	18	17	18	17	17	17	17
DYS450	8	8	8	8	8	8	8
DYS444	13	13	13	14	13	13	13
DYS481	25	25	25	25	24	25	25
DYS520	21	21	21	21	21	21	21
DYS446	14	14	14	14	13	13	14
DYS617	12	12	12	12	12	12	12
DYS568	11	11	11	11	11	11	11
DYS487	13	13	13	13	13	13	13
DYS572	12	12	12	12	12	12	12
DYS640	12	12	12	12	12	12	12
DYS492	12	12	12	12	12	12	12
DYS565	11	11	11	11	11	11	11
HAPLOGROUP	J-L823	J-L823	J-L823	J-L823	J-L823	J-L823	J-L823

The fact that these five Iberian KGMs' haplotype so closely matches the haplotype of the three pedigreed Katzenellenbogen descendants, taken together with the fact that a significant number of other individuals of Iberian descent are also present on the Katzenellenbogen pedigreed descendants' genetic match lists, raises the distinct possibility that the Katzenellenbogen rabbinical lineage has a Sephardic ethnic origin.[30] This possibility is also consistent with known Sephardic migration patterns[31] (see DNA Evidence of Sephardic Descent).

TABLE 4: Comparison of Y-DNA67 Results between Pedigreed Katzenellenbogen Paternal Descendants and Newly-Identified Iberian Genetic Matches

Y-DNA STR MARKER	Pedigreed Katzenellenbogen Paternal Descendants			Newly-Identified Iberian Katzenellenbogen Genetic Matches				
	Richard Ellenbogen	David Kellen	Brian Selwyn	Rodolfo Echeverria Dominguez Sr.	Xico Garcia	Gilbert Marquez	Eddy L. Romero	Manuel Tenorio
DYS393	12	12	12	12	12	12	12	12
DYS390	23	23	23	23	23	23	23	23
DYS19	14	14	14	14	14	14	14	14
DYS391	10	10	10	10	10	10	10	10
DYS385	14-17	14-17	14-17	14-17	16-17	14-17	14-17	14-17
DYS426	11	11	11	11	11	11	11	11
DYS388	15	15	15	17	17	17	17	17
DYS439	12	12	12	12	12	12	12	12
DYS389I	13	13	13	13	13	13	13	13
DYS392	11	11	11	11	11	11	11	11
DYS389II	29	29	29	29	29	29	29	29
DYS458	17	17	17	17	17	17	17	17
DYS459	8-8	8-8	8-8	8-8	8-8	8-8	8-8	8-8
DYS455	11	11	11	11	11	11	11	11
DYS454	11	11	11	11	11	11	11	11
DYS447	25	25	25	25	25	24	25	25
DYS437	14	14	14	14	14	14	14	14
DYS448	20	20	20	20	20	20	20	20
DYS449	25	25	25	25	25	25	25	25
DYS464	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16	14-14-16-16
DYS460	11	11	11	11	11	11	11	12
Y-GATA-H4	10	10	10	10	10	10	10	10
YCAII	21-22	21-22	21-22	21-22	21-22	21-23	21-22	21-22
DYS456	15	15	15	15	15	15	15	15
DYS607	14	14	14	14	14	14	14	14
DYS576	19	19	19	18	18	19	18	18
DYS570	18	18	17	18	18	18	18	18
CDY	31-31	31-31	31-31	31-31	34-34	31-31	33-33	33-33
DYS442	13	13	13	13	13	13	13	13
DYS438	10	10	10	10	10	10	10	10
DYS531	11	11	11	11	11	11	11	11
DYS578	8	8	8	8	8	8	8	8
DYF395S1	15-16	15-16	15-16	15-16	15-16	15-16	15-16	15-16
DYS590	8	8	8	8	8	8	8	8
DYS537	11	11	11	11	11	11	11	11
DYS641	11	11	11	11	11	11	11	11
DYS472	8	8	8	8	8	8	8	8
DYF406S1	11	11	11	11	11	11	11	11
DYS511	9	9	9	9	9	9	9	9
DYS425	12	12	12	12	12	12	12	12
DYS413	21-22	21-22	21-22	21-22	21-22	21-22	21-22	21-22
DYS557	18	19	19	19	18	19	19	19
DYS594	10	10	10	10	10	10	10	10
DYS436	12	12	12	12	12	12	12	12
DYS490	12	12	12	12	12	12	12	12
DYS534	18	17	18	17	17	16	17	17
DYS450	8	8	8	8	8	8	8	8
DYS444	13	13	13	12	12	12	12	12
DYS481	25	25	25	25	26	25	25	25
DYS520	21	21	21	21	21	21	21	21
DYS446	14	14	14	14	14	15	14	14
DYS617	12	12	12	12	12	12	12	12
DYS568	11	11	11	11	11	11	11	11
DYS487	13	13	13	13	13	13	13	13
DYS572	12	12	12	11	12	12	12	12
DYS640	12	12	12	12	12	12	12	12
DYS492	12	12	12	12	12	12	12	12
DYS565	11	11	11	11	11	11	11	11
HAPLOGROUP	J-L823	J-L823	J-L823	J-YSC0000076	J-YSC0000076	J-M267	J-L823	J-L823

Time-to-Most Recent Common Ancestor (TMRCA) Predictions

FTDNA's time predictor (TiP®) model was used to predict the time-to-most recent common ancestor (TMRCA) probabilities for the three pedigreed Katzenellenbogen descendants, Richard Ellenbogen, David Kellen, and Brian Selwyn, as well as for nine of their genetic matches, including Viktor Katsenelenbogen, the four newly-identified Jewish Katzenellenbogen genetic matches, and four of five newly-identified Iberian Katzenellenbogen genetic matches.[32]

Pedigreed Katzenellenbogen Descendants

In comparing Y-DNA67 marker results, for the purpose of estimating the probability of the TMRCA, each pedigreed Katzenellenbogen descendant was compared to the other two pedigreed descendants. These probability predictions are presented numerically in Table 5 and graphically in Figure 4.

Table 5: Time-to-Most Recent Common Ancestor (TMRCA) Predictions for Pedigreed Paternal Descendants of the Katzenellenbogen Rabbinic Lineage

Richard Ellenbogen's and David Kellen's most recent common ancestor (MRCA), Rabbi Moses Katzenellenbogen (1589 – 1643), preceded them in the Katzenellenbogen rabbinical lineage by eleven generations (see Table 1). The actual probability of the MRCA living within eleven generations is therefore 100 percent. FTDNA's time predictor (TiP®) model predicts a 95.8 percent chance of their MRCA living within eleven generations (see Table 5). With a margin of error of only 4.2 percent (100% – 95.8% = 4.2%), this TMRCA prediction is highly accurate.

David Kellen's and Brian Selwyn's MRCA, also Rabbi Moses Katzenellenbogen, preceded David in the lineage by eleven generations, and Brian by ten generations. FTDNA's time predictor model predicts a 93.0 percent chance of their most recent common ancestor living within ten generations, and a 95.3 percent chance of their MRCA living within eleven generations. With a margin of error of between 4.7 – 7.0 percent, this TMRCA prediction is also highly accurate.

Richard Ellenbogen's and Brian Selwyn's MRCA, Rabbi Naftali Hirsch (d. 1800), preceded Richard in the lineage by eight generations, and Brian by seven generations. FTDNA's time predictor (TiP®) model predicts a 78.5 percent chance of their most recent common ancestor living within seven generations, and an 85.0 percent chance of their MRCA living within eight generations. The time predictor model overestimates the actual TMRCA by 15 – 21.5 percent, which is still reasonably accurate, especially for a lineage of this age. Overestimation of the TMRCA in the range of between 5 – 50 percent has been typically reported in previous Y-DNA studies of rabbinical lineages.[33] [34] [35]

Figure 4: Mean Probability of the Common Ancestor Living within a Specified

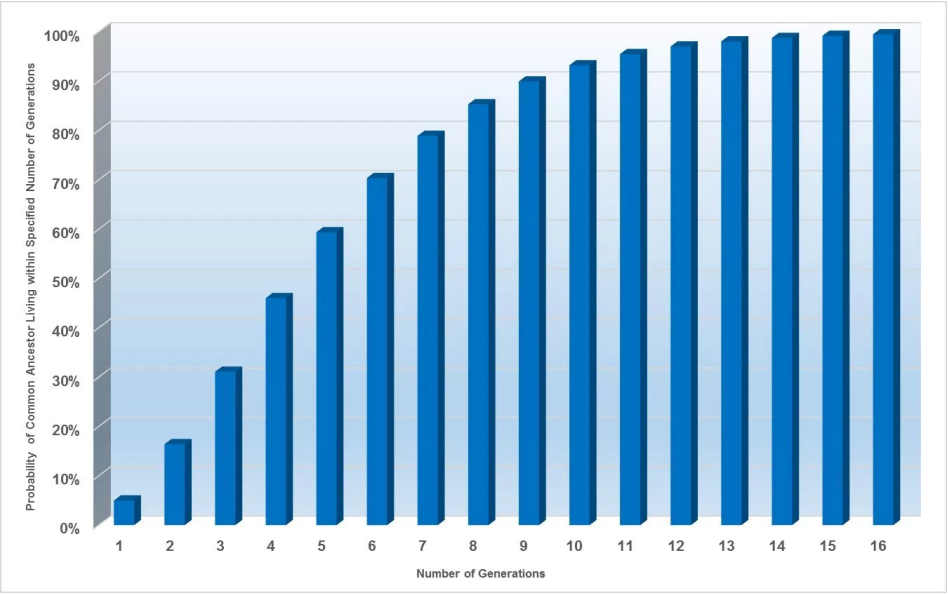
Number of Generations	Probability of the Common Ancestor Living within a Specified Number of Generations			Mean
	Ellenbogen-Kellen	Selwyn-Ellenbogen	Kellen-Selwyn	
1	5.2%	4.9%	4.9%	5.0%
2	16.9%	16.2%	16.2%	16.4%
3	31.8%	30.7%	30.7%	31.1%
4	46.9%	45.6%	45.6%	46.0%
5	60.3%	58.9%	58.9%	59.4%
6	71.2%	69.9%	69.9%	70.3%
7	79.7%	78.5%	78.5%	78.9%
8	86.0%	85.0%	85.0%	85.3%
9	90.5%	89.7%	89.7%	89.9%
10	93.6%	93.0%	93.0%	93.2%
11	95.8%	95.3%	95.3%	95.5%
12	97.2%	96.9%	96.9%	97.0%
13	98.2%	98.0%	98.0%	98.0%
14	98.8%	98.7%	98.7%	98.7%
15	99.3%	99.1%	99.1%	99.2%
16	99.5%	99.5%	99.5%	99.5%

Number of Generations for Pedigreed Paternal Descendants of the Katzenellenbogen Rabbinic Lineage

Katzenellenbogen Descendant of Unknown Pedigree

Viktor Katsenelenbogen represents an intriguing case. Although he does not have a documented pedigree, his paternal lineage possesses the Katzenellenbogen surname, and he genetically matches all three pedigreed Katzenellenbogen descendants. His Y-DNA allele values match those of Richard Ellenbogen and Brian Selwyn at 59 of 67 STR marker locations, and match those of David Kellen at 60 of 67 STR marker locations (see Table 2). Viktor also belongs to the same J-L823 haplogroup.

Although he shares the Katzenellenbogen surname with the pedigreed Katzenellenbogen descendants, and he undoubtedly shares a common paternal ancestor with them, his relatively high number of allele mutations raises a question as to whether his most recent



common ancestor precedes or succeeds the founder of the rabbinic line, Rabbi Meir Katzenellenbogen (b. 1482).

FTDNA's time predictor (TiP) model predicts a 35 – 60 percent chance (mean = 43.4%) of Viktor Katsenelenbogen's MRCA with the three pedigreed Katzenellenbogen descendants living within the past twelve generations; a 49 – 82 percent chance (mean = 65.2%) of him living within the past sixteen generations, and a 60 – 93 percent chance (mean = 79.5%) of him living within the past twenty generations (see Figure 5).

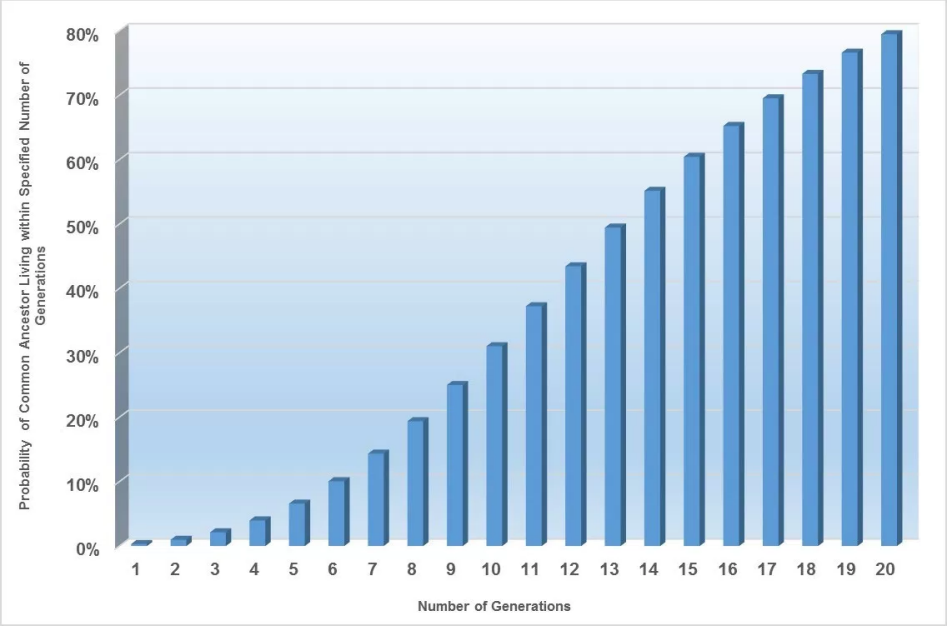
Based on the fact that the TiP model has been found to overestimate the TMRCA by 4.2 – 22.5 percent in this study, and by as much as 50 percent in other Y-DNA studies of rabbinical lineages,[36] and the fact that Viktor Katsenelenbogen and his known ancestors bear the Katzenellenbogen surname, there is a reasonable chance (49% – 82%) that the common ancestor who unites Viktor Katsenelenbogen with the Katzenellenbogen rabbinical lineage lived within the past sixteen generations, sometime after the founding of the lineage in 1482.

However, it is also quite possible (18% – 51% chance) that the common ancestor who unites Viktor Katsenelenbogen with the Katzenellenbogen lineage lived more than sixteen generations ago, prior to the founding of the rabbinical line, and long before the era of mandated Jewish surnames. If so, what would explain his family having the Katsenelenbogen surname?

There are several possibilities for how this may have occurred. One possibility is that a common male ancestor who lived prior to the founding of the rabbinical lineage had several sons. Rabbi Meir Katzenellenbogen (b. 1482), who founded the rabbinical line, descended from one of these sons (Rabbi Isaac), and a non-rabbinical Jewish line descended from a different one of these sons.[37] At some point, one of the descendants of the non-rabbinical line married his cousin – a woman from the rabbinical line – and adopted her Katzenellenbogen surname.

The authors have previously encountered a similar example of this dual paternal and maternal descent in their study of the Twersky Chassidic dynasty.[38] Another possibility is that the Katzenellenbogen surname predates Meir Katzenellenbogen by several generations and was passed down through the patrilineal line. In this scenario, Viktor Katsenelenbogen would not descend from Rabbi Meir Katzenellenbogen directly, but rather from a cousinly Katzenellenbogen line.[39] [40]

Figure 5: Mean Probability of the Common Ancestor Living within a Specified Number of Generations for Viktor Katsenelenbogen and Pedigreed Descendants of the Katzenellenbogen Rabbinic Lineage



Newly-Identified Katzenellenbogen Genetic Matches of Jewish Descent

One of the most satisfying and potentially useful applications of the identification of the Y-DNA genetic signature of a rabbinical lineage, is the identification of previously unknown individuals who share a common paternal ancestor with that lineage, and who, based upon when that common ancestor lived, may even be descendants of that lineage.

In regard to the four newly-discovered Jewish Katzenellenbogen genetic matches KGMs), the closeness of the genetic match to the haplotype of the three pedigreed Katzenellenbogen descendants varied from 63 of 67 allele values for Richard Dahl and Samuel Gelfand, and 64 of 67 allele values for Bennett Greenspan, to 65 of 67 allele values for Marvin Zaveloff (see Table 3). Although none of the newly-identified Jewish KGMs have the Katzenellenbogen surname, or an oral history of descent from the Katzenellenbogen rabbinical lineage, all four match the haplotype of the three pedigreed Katzenellenbogen descendants more closely than does Viktor Katsenelenbogen.

FTDNA's time predictor model predicts between an 81.0 – 96.8 percent chance (mean = 87.5%) of the newly-identified Jewish KGMs' MRCA with the pedigreed Katzenellenbogen descendants living within the past twelve generations, and between a 94.5 – 99.4% chance (mean = 96.6%) of the MRCA living within the past sixteen generations (Figure 6).[41] These probabilities are only slightly less than those calculated for the pedigreed Katzenellenbogen descendants themselves (see Table 5).

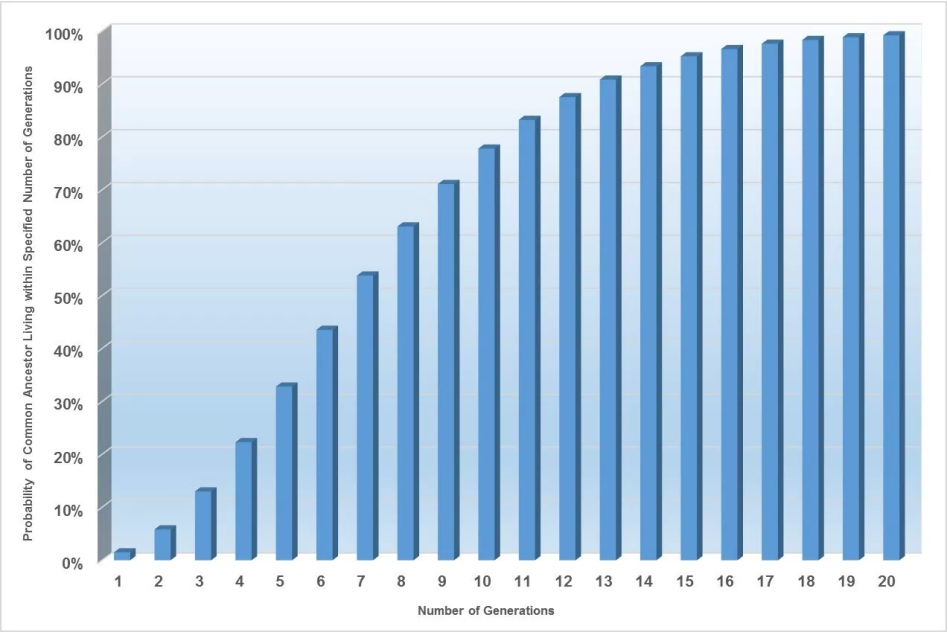
Based upon the closeness of their genetic matches, as evidenced by the >95% mean probability of their MRCA living within the past sixteen generations, and the accuracy of the FTDNA time predictor model for predicting the TMRCA for the pedigreed Katzenellenbogen descendants, it is reasonably likely that their MRCA lived within the past sixteen generations, and that all four of these newly-identified Jewish KGMs descend from the Katzenellenbogen rabbinical lineage sometime after the founding of the lineage in 1482.

Figure 6: Mean Probability of the Common Ancestor Living within a Specified Number of Generations for Pedigreed Katzenellenbogen Descendants and their Newly-Identified Jewish Genetic Matches

Newly-Identified Katzenellenbogen Genetic Matches of Iberian Descent

One of the most intriguing findings of this study was the identification of a significant percentage of previously unknown Katzenellenbogen genetic matches (KGMs) of Iberian ethnicity. As many as nineteen genetic matches with Iberian surnames representing five distinct families - Carrasco, Echeverria, Marquez, Romero, and Tenorio - appeared on the genetic match lists of pedigreed Katzenellenbogen descendants.

Members of these same five families, in addition to three others with Iberian surnames



(Chavez, Garcia, and Lopez) appeared on the genetic match lists of Viktor Katsenelenbogen, and the newly-identified KGMs of Jewish descent. Members of five of these eight families (Echeverria, Garcia, Marquez, Romero, and Tenorio) accepted our invitation to join our Katzenellenbogen Y-DNA project. Of these five family surnames, three of them (Garcia, Marquez, and Romero) are known *converso* surnames.[42]

Information collected regarding their oral histories, family trees, and DNA tests showed all five of these individuals to possess both Iberian ancestry, and one or more markers of Sephardic descent, including an oral history of having *converso* ancestry, and/or DNA evidence of Jewish ancestry.[43] This information is summarized as follows:

Rodolfo Echeverria Dominguez Sr.

Nearly all of his Y-DNA genetic matches who identify their ancestral origins reported Ashkenazi as their ethnic ancestry.[44] This was observed at all STR marker levels (12, 25, 37, 67, 111) and genetic distances.[45] The reported ancestral origin of his closest Y-DNA 67-marker matches at genetic distances £ 2 are Spain, Lithuania, and Poland. At a genetic distance of 2, one of his 67-marker matches reported Spain as their ancestral origin, and *Anusim* (Hebrew for converted Jews) as their ethnic ancestry.[46] At a genetic distance of 1, one of his 25-marker matches reported "Sephardic" as their ethnic ancestry.

He shares identical allele values with Eddy L. Romero at 64 of 67 Y-DNA STR marker locations, with Manuel Tenorio at 63 of 67 marker locations, and with Xico Garcia and

Gilbert Marquez at 61 of 67 marker locations, indicating that he shares a common paternal ancestor with other newly-identified genetic matches of Iberian descent, and of likely *converso* ancestry.

The vast majority of his FTDNA Family Finder matches have Iberian surnames, the most common being Echeverria, Ordines, and Torres. However, some of his more distant Family Finder matches have Jewish ancestral surnames (*e.g.;* Cohanim, Eichenberg, Fischer, Leidel, Rosenbaum, Schneider, Schreiber). According to his FTDNA "My Origins" autosomal DNA test, his ethnic makeup is 59% European, 24% New World, 6% East Asian, 3% Central/South Asian, 6% Middle Eastern, and 2% African, of which the latter two components are consistent with being of Sephardic ethnic ancestry.

Xico Garcia

Nearly all of his Y-DNA genetic matches who identify their ancestral origins reported Ashkenazi as their ethnic ancestry. This was observed at all STR marker levels (12, 25, 37, 67, 111) and genetic distances. The reported ancestral origin of his closest Y-DNA 67-marker matches at genetic distances £ 3 is Belarus, Latvia, Lithuania, Poland, and Spain. At a genetic distance of 4, one of his 37-marker matches reported Spain as their ancestral origin, and *Anusim* as their ethnic ancestry. At a genetic distance of 2, one of his 25-marker matches reported "Sephardic" as their ethnic ancestry.

He shares identical allele values with Eddy L. Romero on 62 of 67 STR marker locations, and with Rodolfo Echeverria Dominguez Sr. and Manuel Tenorio at 61 of 67 marker locations, indicating that he shares a common paternal ancestor with other newly-identified genetic matches of Iberian descent, and of likely *converso* ancestry.

The vast majority of his FTDNA Family Finder matches have Iberian surnames, the most common being Gonzales, Martinez, and Garcia. According to his "My Origins" autosomal DNA test, his ethnic makeup is 67% European, 19% New World, 7% East Asian, 6% Middle Eastern, and 1% African, of which the latter two components may be indicative of Sephardic ethnic ancestry.

Gilbert Marquez

Nearly all of his Y-DNA genetic matches who identify their ancestral origins reported Ashkenazi as their ethnic ancestry. This was observed at all STR marker levels (12, 25, 37, 67, 111) and genetic distances. The reported ancestral origin of his closest Y-DNA 67-marker matches (genetic distances £ 6) are Spain and Poland. At a genetic distance of 4, one of his 67-marker matches reported Spain as their ancestral origin, and *Anusim* as their ethnic ancestry. At a genetic distance of 2, one of his 25-marker matches reported "Sephardic" as their ethnic ancestry.

Gilbert shares identical allele values with Rodolfo Echeverria Dominguez at 61 of 67 STR marker locations, and with Eddy L. Romero at 60 of 67 marker locations, indicating that he shares a common paternal ancestor with other newly-identified genetic matches of Iberian descent, and of likely *converso* ancestry. He did not take a Family Finder test, so his "My Origins" autosomal DNA ethnic makeup was not reported.

Eddy L. Romero

Nearly all of his Y-DNA genetic matches who identify their ancestral origins reported Ashkenazi as their ethnic ancestry. This was observed at all STR marker levels (12, 25, 37, 67) and genetic distances. The reported ancestral origin of his closest Y-DNA 67-marker matches (genetic distances £ 2) is Spain. The reported ancestral origin of his Y-DNA 67-marker matches at genetic distances ³ 2 is Spain, Poland, Belarus, Latvia, Germany, Lithuania, Austria, Ukraine, and Bulgaria. At a genetic distance of 5, one of his 67-marker matches reported Spain as their ancestral origin, and *Anusim* as their ethnic ancestry. At a genetic distance of 7, one of his 67-marker matches reported "Sephardic" as their ethnic ancestry.

He shares identical allele values with Manuel Tenorio at 66 of 67 STR marker locations, with Rodolfo Echeverria Dominguez Sr. at 64 of 67 marker locations, with Xico Garcia at 62 of 67 marker locations, and with Gilbert Marquez at 60 of 67 marker locations, indicating that he shares a common paternal ancestor with other newly-identified genetic matches of Iberian descent, and of likely *converso* ancestry.

The vast majority of his FTDNA Family Finder matches have Iberian surnames, the most common being Martinez, Garcia, and Trujillo. However, many of his more distant Family Finder matches have Jewish ancestral surnames (*e.g.;* Blumenthal, Cohen, Feldman, Frankel, Goldberg, Rosenberg, Rubenstein, Shapero). According to his "My Origins" autosomal DNA test, his ethnic makeup is 62% European, 22% New World, 8% East Asian, 1% Central/South Asian, 2% Middle Eastern, and 3% African, of which the latter two components may be indicative of Sephardic ethnic ancestry.

Manuel Tenorio

Nearly all of his Y-DNA genetic matches who identify their ancestral origins reported Ashkenazi as their ethnic ancestry. This was observed at all STR marker levels (12, 25, 37, 67) and genetic distances. The reported ancestral origin of his closest Y-DNA 67-marker matches (genetic distances £ 1) is Spain. The reported ancestral origin of his Y-DNA 67-marker matches at genetic distances ³ 1 is Spain, Lithuania, Poland, Belarus, Latvia, Bulgaria, Germany, Austria, and Ukraine.

At a genetic distance of 4, one of his 67-marker matches reported Spain as their ancestral origin, and *Anusim* as their ethnic ancestry. At a genetic distance of 6, one of his 67-marker matches reported "Sephardic" as their ethnic ancestry.

Manuel shares identical allele values with Eddy L. Romero at 66 of 67 STR marker locations, and with Rodolfo Echeverria Dominguez Sr. at 63 of 67 marker locations, indicating that he shares a common paternal ancestor with other newly-identified genetic matches of Iberian descent, and of likely *converso* ancestry. He did not take a Family Finder test, so his "My Origins" autosomal DNA ethnic makeup was not reported, but he does have an oral history of *converso* ancestry in his family.[47]

Relationship between Katzenellenbogen Genetic Matches of Jewish and Iberian Ancestry

The distribution of Iberian KGMs on the match lists of Jewish KGMs at different Y-DNA STR marker levels are shown in Table 6. Overall, Iberian KGMs comprised between 8.3 – 29.0 percent of the Jewish KGMs' match list, with a mean value of 20.3 percent.

Three data outliers were observed at the 12 STR marker level for the pedigreed Katzenellenbogen descendants, where only one genetic match and twelve total matches were reported. This appears to be due to an anomaly in the FTDNA Y-DNA genetic match reporting system. After eliminating the three outliers, the range of Iberian KGM matches was 15.0 – 29.0 percent, with a mean value of 21.6 percent. Brian Selwyn had no genetic matches reported at the 25 marker level. This also appears to be due to an anomaly of the FTDNA Y-DNA genetic match reporting system.

An interesting observation was that the newly-identified Iberian KGMs matched the newly-identified Jewish KGMs more closely (*i.e.*, at higher levels of Y-DNA markers tested, and on more STR markers) than they did the pedigreed Katzenellenbogen descendants, indicating that they shared a more recent common ancestor with them. As previously discussed, several of the Iberian KGMs' allele values were identical to those of the newly-identified Jewish KGMs. In particular, they displayed the same two idiosyncratic allele values at STR marker location DYS388 and DYS576 (see Tables 3 and 4).

FTDNA's time predictor model predicts between a 41.4 – 81.2 percent chance (mean = 59.2%) of the four Iberian KGMs' MRCA with pedigreed Katzenellenbogen descendants living within the past twelve generations, and between a 69.6 – 94.6 percent chance (mean = 82.4%) of the MRCA living within the past 16 generations (Figure 7). [48] [49]

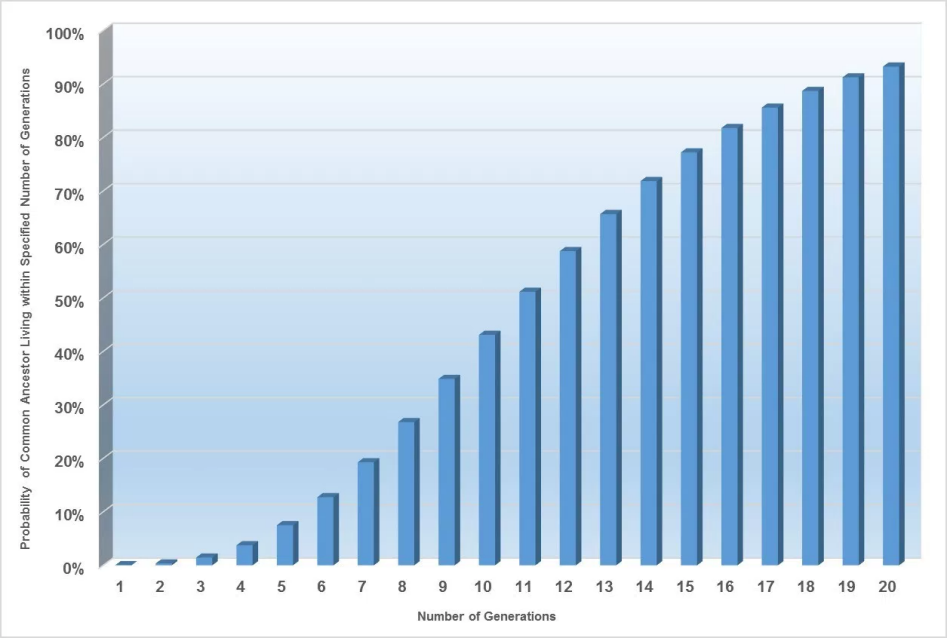
These TMRCA probabilities are approximately 14-to-26 percent less than those calculated for the newly-identified Jewish KGMs (see Figure 6). Based upon the closeness of their genetic matches, as evidenced by the >80 percent mean probability of their MRCA living

within the past 16 generations, and the accuracy of the FTDNA time predictor model for predicting the TMRCA for the pedigreed Katzenellenbogen descendants, it is reasonably likely that the newly-identified Iberian KGMs' most recent common ancestor in the Katzenellenbogen lineage, like that of the newly-identified Jewish KGMs, also lived sometime after the founding of the lineage in 1482 (see Summary and Conclusions).

Table 6: Jewish-Iberian Genetic Match Rates among Katzenellenbogen Descendants

Descendant Category	Katzenellenbogen Descendant	STR Marker Level	Genetic Matches of Iberian Ancestry	Total Number of Genetic Matches	Jewish-Iberian Genetic Match Rate
Pedigreed Jewish Katzenellenbogen Descendants	Richard Ellenbogen	12	1	12	8.3%
		25	11	42	26.2%
		37	7	37	18.9%
		67	3	20	15.0%
	David Kellen	12	1	12	8.3%
		25	10	41	24.4%
		37	6	36	16.7%
		67	8	29	27.6%
	Brian Selwyn	12	1	12	8.3%
		25	0	0	N/A
		37	5	25	20.0%
		67	3	20	15.0%
Suspected Jewish Katzenellenbogen Descendant	Viktor Katsenelenbogen	12	9	54	16.7%
		25	18	62	29.0%
		37	5	33	15.2%
		67	4	14	28.6%
Possible Jewish Katzenellenbogen Descendants	Richard Dahl	12	20	95	21.1%
		25	17	81	21.0%
		37	10	46	21.7%
		67	9	38	23.7%
	Samuel Gelfand	12	20	95	21.1%
		25	18	79	22.8%
		37	11	59	18.6%
		67	9	38	23.7%
	Bennett Greenspan	12	20	95	21.1%
		25	18	79	22.8%
		37	10	56	17.9%
		67	10	41	24.4%
	Marvin Zaveloff	12	20	94	21.3%
		25	18	79	22.8%
		37	12	57	21.1%
		67	12	43	27.9%

Figure 7: Mean Probability of the Common Ancestor Living within a Specified Number of Generations for Pedigreed Katzenellenbogen Descendants and their Newly-Identified Iberian Genetic Matches



Lines of Evidence of Sephardic Descent of the Katzenellenbogen Rabbinical Lineage

Due, at least in part, to the German-derived surname of its founder, and to the fact that he was appointed rabbi of an Ashkenazi synagogue, the Katzenellenbogen rabbinical lineage has always been considered as an iconic Ashkenazi rabbinical lineage. In fact, according to the Jewish Encyclopedia, the Katzenellenbogen surname is sometimes used in conjunction with the Ashkenazi epithet.[50] The results of this study, however, challenge this long-held belief, and provide compelling evidence that the Katzenellenbogen rabbinical lineage is of Sephardic origin.

There are five main lines of evidence supporting the conclusion that the Katzenellenbogen rabbinical lineage has a Sephardic origin. These lines of evidence include: (1) An oral history of *converso* ancestry among newly-identified Iberian KGMs; (2) DNA evidence of *converso* ancestry among newly-identified Iberian KGMs; (3) An oral history of Sephardic ancestry among both pedigreed Katzenellenbogen descendants and newly-identified Jewish KGMs; (4) DNA evidence of Sephardic ancestry among newly-identified Jewish

KGMs, and (5) Y-DNA haplogroup evidence for both newly-identified Jewish and Iberian KGMs. Each of these lines of evidence is presented and briefly discussed below.

Oral History of *Converso* Ancestry among Iberian Katzenellenbogen Genetic Matches

One of the five newly-identified Iberian Katzenellenbogen descendants, Manuel Tenorio, has a history of *converso* ancestry in his family, reporting that his grandparents and great-grandparents practiced their Jewish religion in secret.[51] Mr. Tenorio is a close genetic match to both Eddy L. Romero and Rodolfo Echeverria Dominguez, indicating that they most likely share a common *converso* paternal ancestor. Genealogical evidence from research of the paper trail suggests that the Tenorio and Romero lines may be connected, and that they may share a common paternal ancestor who lived during the early 1700s.[52]

DNA Evidence of *Converso* Ancestry among Iberian Katzenellenbogen Genetic Matches

When descendants of a paternal lineage of Iberian or Jewish ethnicity take a Y-DNA test, the overwhelming majority of their genetic matches are generally other individuals of similar ethnicity. If a significant number of genetic matches of Jewish ancestry appear on the Y-DNA match lists of the descendants of a particular Iberian paternal lineage, this provides an indication that one or more of the ancestors in the lineage were *conversos*, and that the lineage may be of Sephardic origin. The more distant the Jewish genetic matches are, the further back in time the Iberian common ancestor is likely to be.

In this Y-DNA study, the five newly-identified Iberian KGMs were all found to have a significant proportion of Jewish genetic matches on their Y-DNA match lists. As previously discussed, nearly all of their genetic matches who identified their ancestral origins reported Ashkenazi as their ethnic ancestry. This was observed at all STR marker levels and genetic distances. One of the genetic matches common to all five descendants reported Spain as their ancestral origin, and *Anusim* (Hebrew for converted Jews) as their ethnic ancestry. Another genetic match common to all five descendants reported "Sephardic" as their ethnic ancestry.

Three of the five Iberian descendants also took FTDNA's Family Finder autosomal DNA test. Their ethnic admixture "My Origins" test showed significant Middle Eastern and African components, which may be indicative of Sephardic ethnic ancestry.[53] In addition, many of their more distant Family Finder matches had Jewish ancestral surnames. Autosomal DNA research studies have demonstrated the persistence of autosomal DNA segments in the Ashkenazi Jewish population, due to its endogamy, resulting in the detection of many more distant matches than for non-Jewish populations.[54][55][56]

Taken together, the Y-DNA and autosomal DNA data provides compelling supportive evidence of a *converso* ancestry and Sephardic ancestral origin of the newly-identified Iberian Katzenellenbogen genetic matches.

Oral History of Sephardic Ancestry among Jewish Katzenellenbogen Descendants

One of the three pedigreed Katzenellenbogen descendants, Brian Selwyn, reported an oral history of his family having Spanish or Sephardic ancestry.[57] Brian is a close genetic match to the two other pedigreed Katzenellenbogen descendants, Richard Ellenbogen and David Kellen, and he shares known common paternal ancestors with them, indicating that they most likely share a common Sephardic ancestry. In addition, Viktor Katsenelenbogen's family also has an oral history of his paternal line having originated in Spain,[58] as does newly-identified Jewish Katzenellenbogen descendant, Richard Dahl's.[59]

DNA Evidence of Sephardic Ancestry among Jewish Katzenellenbogen Descendants

When descendants of a paternal lineage of Jewish or Iberian ethnicity take a Y-DNA test, the overwhelming majority of their genetic matches are generally other individuals of similar ethnicity. If a significant number of genetic matches of Iberian or *converso* ancestry appear on the Y-DNA match lists of the descendants of a particular Jewish paternal lineage, this provides an indication that the lineage may be of Sephardic rather than Ashkenazi origin. The more distant the Iberian genetic matches are, the further back in time the Sephardic common ancestor is likely to be.

In this Y-DNA study, the three pedigreed Katzenellenbogen descendants, as well as the Katzenellenbogen descendant of uncertain pedigree, and the four newly-discovered Jewish Katzenellenbogen descendants, were all found to have a significant proportion (mean of 20.3%) of *converso* genetic matches of Iberian ancestry on their Y-DNA match lists (see Table 6).

Despite the three-generation difference between their respective common ancestors, the three pedigreed Katzenellenbogen descendants have a similar percentage of *converso* genetic matches of Iberian ancestry on their Y-DNA match lists. Viktor Katsenelenbogen, despite an uncertain pedigree, is likely to be a Katzenellenbogen paternal descendant on the basis of his surname, oral history, and Y-DNA genetic signature. He has a similar percentage of *converso* genetic matches of Iberian descent on his Y-DNA match list, as do the four newly-discovered Jewish Katzenellenbogen genetic matches.

These significant percentages of *converso* genetic matches of Iberian ancestry on the Y-DNA match lists of all pedigreed Katzenellenbogen descendants and their Jewish KGMs remained relatively constant, irrespective of geographic location, pedigree, and generation of the common ancestor. This points to a Sephardic ancestral origin of the Katzenellenbogen rabbinical lineage.

Y-DNA Evidence of Sephardic Descent: The J-M267 / J-L823 Haplogroup

Essential to determining the unique Y-DNA genetic signature of a particular rabbinical lineage is the terminal single nucleotide polymorphism (SNP), which defines the haplogroup to which descendants of the lineage belong.[60]

In addition to having a high percentage of standard Y-DNA markers or short-tandem repeat (STR) allele values in common, another Y-DNA characteristic that all pedigreed descendants of the Katzenellenbogen rabbinical lineage and their newly-discovered genetic matches share is that they were all initially classified as belonging to the J-M267 haplogroup. Men from this lineage share a common paternal ancestor, which is defined by the presence of the SNP mutation referred to as M267.

Y DNA haplogroup J-M267, also commonly known as haplogroup J1, is a subclade (branch) of Y-DNA haplogroup J-P209, along with its sibling clade Y-DNA haplogroup J-M172, commonly known as haplogroup J2. Y-DNA haplogroup J1 is estimated to be approximately 20 thousand years old and is thought to have originated somewhere between Anatolia and Mesopotamia.[61] J-M267 has several recognized subclades, most notably J-P58 and J-L823.

Haplogroup J-M267 is found at its highest frequencies in the southern Middle East, west of the Zagros Mountains in Iran, to the Mediterranean Sea, and encompassing the entire Arabian Peninsula. The J-M267 marker has been carried by Middle Eastern traders into Europe, central Asia, India, and Pakistan.

As with other populations with Mediterranean ancestry, this lineage is found at substantial frequencies within Jewish populations. The Cohen modal haplotype lineage, as well as the presumed lineage of the Prophet Mohammed, are found in Haplogroup J-M267. [62] [63] [64] [65]

To further delineate the haplogroup of the Katzenellenbogen rabbinical lineage, we tested the Y-DNA of the three pedigreed Katzenellenbogen descendants, and the likely Katzenellenbogen descendant (Viktor Katsenelenbogen) for the J-L823 terminal SNP, to investigate whether they belong to the J-L823 subclade. We selected this particular SNP for testing because several of our newly-identified Jewish and Iberian KGMs had previously tested positive for it, and because it has been previously identified in other Y-

DNA studies of Sephardic Jews and *conversos*.[66] [67] This SNP was also suggested for testing by Bennett Greenspan.[68]

All three pedigreed Katzenellenbogen descendants tested positive for the J-L823 terminal SNP, as did Viktor Katsenelenbogen. All four of the newly-identified Jewish KGMs, who had previously tested for this terminal SNP belonged to the J-L823 subclade, as did two of the five newly-identified Iberian KGMs; the other three Iberian KGMs had not been tested for it.

Although a specific "Sephardic SNP" has not yet been identified, the J-L823 SNP does provide at least supporting evidence of possible Iberian/Sephardic ethnic ancestry. Wim Penninx has concluded that the J-L823 subclade split into separate Ashkenazi and Sephardic branches:[69]

"Many Jewish Y-DNA branches have interesting characteristics. J-L823 is special with its half palindrome, and shows a special history ... In total, seven J-L823 branches are known at the moment: three Iberian, three Ashkenazi, and one German. One of the three Ashkenazi lines almost certainly passed Iberia before arriving in the Ashkenazi countries. It is most likely that this ancestor left Spain long before the time of the Edict of Expulsion. The statistics on the other two branches is insufficient to make a claim on their historic path. When members of all six branches are measured with Next Generation Sequencing (NGS) tests, and the data is well-compared, we will be able to determine the moments the branches split."

It is interesting that the J-L823 subclade has been determined to have both Ashkenazi and Iberian branches, and we agree that future NGS tests will help to shed light on the historic branching of the Ashkenazi and Sephardic lines.

Taken together, the three lines of DNA evidence discussed above, in combination with the two lines of evidence obtained through the oral histories, and the historic information regarding Sephardic migration patterns, leads us to conclude that the Katzenellenbogen rabbinical lineage most likely had a Sephardic origin.

Recommendations for Future Study

As is the case for the majority of pioneering genetic genealogy studies, the Katzenellenbogen Y-DNA study raises many new research questions, and opens many new promising research avenues to exploration.

Based upon the matching Y-DNA results of three pedigreed paternal descendants of the Katzenellenbogen rabbinical lineage, we have succeeded in identifying the haplotype and

haplogroup that characterizes the Y-DNA signature of the Katzenellenbogen rabbinical lineage, back to their most recent common ancestor (MRCA).

This Y-DNA genetic signature is based on the testing of 67 STR markers, and one additional downstream single nucleotide polymorphism (SNP). Due to different allele values at three specific STR marker locations among the three pedigreed descendants, there is some uncertainty regarding which allele values represent ancestral values, and which represent mutations. Undoubtedly, as other descendants of the Katzenellenbogen lineage are identified, and additional STR markers and SNPs are tested, these uncertainties will be reduced, and the Katzenellenbogen Y-DNA genetic signature will be further extended and refined.

In this study, we identified four Jewish Katzenellenbogen genetic matches (KGMs) and five Iberian KGMs on the basis of their matching Y-DNA genetic profiles, rather than by traditional genealogical research methods. Analysis of the time-to-most recent common ancestor (TMRCA) using the FTDNA time predictor model, led us to the hypothesis that their MRCA most likely lived sometime after the founding of the lineage in 1482. The use of phylogenetic-based methods to estimate the TMRCA may lead to different hypotheses regarding when the MRCA lived.[70]

We recommend that genealogical studies be conducted which research the paper trail of both the Jewish and Iberian KGMs identified in this study, in an attempt to identify the common ancestor which links them to the Katzenellenbogen lineage. Identifying the MRCA would help determine which of the current models yields more accurate TMRCA predictions.

It would also be useful to conduct Y-DNA research studies which compare TMRCA model predictions for pedigreed descendants of other rabbinical lineages where the TMRCAs are known. Such studies would provide useful validation data for evaluating the accuracy and reliability of current STR mutation rate-based models and emerging phylogenetic-based methods which employ next-generation sequencing (NGS) techniques.

Another potential new avenue of research involves the surprising finding that the Katzenellenbogen rabbinical dynasty most likely had a Sephardic origin. This raises the possibility that many other Jewish and rabbinical lineages, once thought to be of Ashkenazi origin, are actually of Sephardic origin as well.

In this regard, we recommend that Y-DNA research studies which focus specifically on Sephardic Jewish populations be conducted, together with studies of Iberian individuals of known *converso* ancestry. Such Y-DNA research studies are needed to broaden the Sephardic Y-DNA database, and would yield much useful information regarding Sephardic allele patterns, SNPs and haplogroups.

Autosomal DNA research studies which explore differences in chromosome segments and ethnic admixtures between Ashkenazi, Sephardic, and *converso* populations represent yet another promising avenue of research. The essential first step in conducting these types of population-based autosomal DNA research studies lies in identifying appropriate reference populations. This is true of population-based Y-DNA studies as well.

We tested for the J-L823 terminal SNP in this study, which yielded fresh insights into the possible ethnic origins of the Katzenellenbogen rabbinical lineage. In theory, age estimates of clusters based upon SNPs have the potential to be more accurate than those based upon STRs, but the science is still evolving, and more fundamental genealogical research is needed. As NGS tests become more widely available and used, and the full genome database grows, emerging phylogenetic methods may play a larger role in identifying new descendants of rabbinical lines and in defining the Y-DNA genetic signature.

The accurate identification of novel SNPs through testing of sufficiently large populations of both Jewish and Iberian descent, could shed new light on deep ancestral links, and the possible Sephardic origin of the Katzenellenbogen rabbinical lineage, and other Jewish lineages. In particular, identifying the time of the Ashkenazi-Sephardic split remains a challenge for further genealogical study.

Summary and Conclusions

The Katzenellenbogen rabbinical lineage dates back over 500 years. Extensive genealogical research of the Katzenellenbogen family laid the necessary groundwork for identification of three living son-after-son descendants of the Katzenellenbogen rabbinical lineage for this Y-DNA study.

In our preliminary Y-DNA study of the Katzenellenbogen rabbinical lineage, we identified the haplotype and haplogroup of a single pedigreed Katzenellenbogen descendant (Richard Ellenbogen), and a possible descendant having the Katzenellenbogen surname, together with an oral history of descent (Viktor Katsenelenbogen).[71] Based upon their matching Y-DNA results, we hypothesized that we had preliminarily identified the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage. With the identification and testing of two additional pedigreed Katzenellenbogen descendants, we have now confirmed the Y-DNA genetic signature that we identified in our preliminary study.

The near-identical genetic match among the three pedigreed Katzenellenbogen descendants, Richard Ellenbogen, David Kellen, and Brian Selwyn, together with their well-documented paper trail, provides a high degree of confidence that their distinct allele pattern at 67 STR marker locations, which defines their haplotype, in addition to the J-

L823 SNP, which defines their haplogroup, accurately represents the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage.

This Y-DNA genetic signature dates back to their most recent common ancestor, Rabbi Moses Katzenellenbogen (1589 – 1643), the great-great-grandson of the founder of the Katzenellenbogen rabbinical lineage, Rabbi Meir Katzenellenbogen (c. 1482 – 1565).

As previously discussed, thanks to the numerous published genealogies of the Katzenellenbogen family in rabbinical sources, family trees, and *yichus* letters, the authenticity and validity of the lineage has been well-established, and there is a broad consensus among genealogists regarding Rabbi Meir Katzenellenbogen's descendants' identities, and their position in the lineage, particularly for the early generations.

Based upon a solid foundation of traditional genealogical evidence supporting the well-documented paternal lineage between Rabbi Moses Katzenellenbogen (1589 – 1643) and Rabbi Meir Katzenellenbogen (c. 1482 – 1565), there is reason to believe that the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage identified in this study can be extended back four generations to represent that of the founder of the Katzenellenbogen rabbinical lineage, Rabbi Meir Katzenellenbogen.

This hypothesis, however sound, remains to be proven by future genealogical research. Adoptions, non-paternal events, and lineage mistakes, however rare, do occur, even in well-documented rabbinical lineages, and cannot be ruled out without direct Y-DNA evidence.

The extreme closeness of the genetic match between the three pedigreed Katzenellenbogen descendants was unexpected for a lineage that extends over 400 years and eleven generations back to their common ancestor. Another surprising finding was the high degree of accuracy of the FTDNA time predictor model for estimating the time-to-most recent common ancestor (TMRCA) for the pedigreed Katzenellenbogen descendants.

One of the most intriguing research questions raised by this study is in regard to when the most common recent ancestor of the pedigreed Katzenellenbogen descendants and their Iberian genetic matches lived. There are at least three possibilities regarding the origin of the Iberian Katzenellenbogen cluster, and when it may have arisen:[72]

- The first possibility is that the Iberian cluster descends from a cousinly line of Meir Katzenellenbogen. Their common ancestor could have predated Meir Katzenellenbogen by just one or two generations (mid-1400s).[73]

- The second possibility is that the Iberian cluster directly descends from Meir Katzenellenbogen. In this case, one of Meir's non-rabbinical descendants (of which he had many), could have immigrated to any of several Spanish/Portuguese-speaking countries in the New World (*e.g.*, Argentina, Brazil, Cuba, Dominican Republic, Mexico, Puerto Rico, Peru), converted to Catholicism, and acquired their Hispanic surname there, sometime after the 15th century.[74]

- The third possibility is that the Iberian cluster descends from a more distant Iberian ancestor of Meir Katzenellenbogen.[75]

Based upon the closeness of their genetic matches, and the accuracy of the FTDNA time predictor model for predicting the TMRCA for the pedigreed Katzenellenbogen descendants, we believe it is reasonably likely that the TMRCA for the pedigreed Katzenellenbogen descendants and their newly-identified Iberian genetic matches was sometime after the birth of the founder of the rabbinical lineage in 1482.

Lending support to this possibility is the finding from multiple studies of Jewish lineages that the time predictor model tends to overestimate the actual TMRCA in the vast majority of cases.[76] We must, therefore, allow for the possibility that the Iberian cluster may have acquired their surnames from a common ancestor who converted to Catholicism sometime after 1492.

We emphasize, however, that this possibility is no more than a hypothesis that remains to be proven or disproven by future research studies. Currently, neither STR mutation-rate based models, such as the time predictor model, or phylogenetic-based methods, can predict the TMRCA with the necessary precision to allow us to distinguish among these various possibilities, with a high degree of scientific certainty.

One of the more fascinating findings to come out of this study is that the Katzenellenbogen rabbinical lineage has a probable Sephardic origin. Perhaps because the founder of the lineage, Rabbi Meir Katzenellenbogen, was born in the town of Katzenelnbogen, in present-day Germany, from where the family took its name, the lineage which he founded has long been regarded as an iconic Ashkenazi lineage.[77][78] The results of our Y-DNA study challenge that view, and provide compelling genetic evidence that the Katzenellenbogen rabbinical lineage was most likely Sephardic in origin.[79]

This finding, although remarkable, is not without historical precedent. Sephardic Jewry, having been expelled from Spain, found different homes throughout Europe, and Italy,

due to the similarity of its climate, and religious tolerance, was a prime landing place. From the middle of the 1500s onward, the Italian-Jewish community was really a Spanish community.[80] [81]

It is also well-known that a number of major rabbinical families have a long-standing tradition that they descend from pre-Inquisition Spain and Portugal.[82] Two prominent Ashkenazi rabbinical families, Epstein and Horowitz, for instance, claim descent from two brothers who lived in Spain during the 13th century.[83] [84] [85] [86]

The Katzenellenbogen lineage is over 500 years old, with many thousands of descendants widely dispersed throughout the world. Undoubtedly, many of its members were patrilineal descendants of non-rabbinical branches of the family.[87] The fact that the four newly-identified Jewish Katzenellenbogen descendants have unique surnames, but likely descend from the same patrilineal lineage, illustrates the difficulty that confronts many Ashkenazi Jews – their common ancestor often predates the era in which Jewish surnames came into use.

As surname use became mandatory for Jews in most of Europe during the late 1700s – early 1800s, the descendants of those common ancestors adopted a variety of surnames based upon the places they were from, their occupations, nicknames, spouses' surnames, parents' given names, the decisions of the *kahal* (Jewish community council) or the whims of the local authorities.[88] This makes tracing Jewish lineage even more difficult using traditional genealogical methods, and emphasizes the importance of Y-DNA and other genetic tests as an essential component of Jewish genealogy.

One of the more gratifying aspects of this study involved identifying the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage, and then using that genetic signature to either confirm paternal descent from the lineage, or to bring to light possible mistakes in the paper trail.

Although the identity of his common ancestor remains uncertain, for Viktor Katsenelenbogen, the validation of his paternal descent from the Katzenellenbogen lineage through his Y-DNA genetic match to the three pedigreed Katzenellenbogen descendants is a very significant finding, because other than the Katsenelenbogen surname, and a tenuous family legend of rabbinical descent, he had no archival documentation or family tree proving descent from the Katzenellenbogen lineage.[89]

For Bennett Greenspan, the founder and president of Family Tree DNA (FTDNA), the discovery of his paternal descent from the Katzenellenbogen rabbinical lineage is an especially gratifying finding. Bennett's founding of FTDNA was an outgrowth of his profound desire to identify and trace his paternal lineage. The fact that he shares a common ancestor with the illustrious Katzenellenbogen rabbinical lineage, and that there

is a possibility that he may be a descendant of this renowned lineage, came as an astonishing revelation to him, as he had no idea that his paternal lineage had any rabbis of note.[90] [91]

For the five newly-identified Iberian genetic matches, their Y-DNA genetic match to the three pedigreed Katzenellenbogen descendants is also a very significant finding, as it indicates that their paternal ancestors were most likely Jewish *conversos*, and that they share a common paternal ancestor with an historic and renowned rabbinical lineage.

The finding that the Mintz descendant did not match the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage supports what some genealogists had already suspected – that there is a maternal descendant interposed in the Mintz line of descent from Meir Katzenellenbogen. That maternal descendant is likely to be Rabbi Nachum of Slutsk, about whom there is some uncertainty as to whether he was a son or a son-in-law of Meir Wahl Katzenellenbogen.[92] Although this finding awaits confirmation through additional Y-DNA testing, it does illustrate that lineage mistakes can occur, even in lineages that are as deeply-rooted and well-documented as the Katzenellenbogen rabbinical lineage.

As growing numbers of Ashkenazi and Sephardic Jews turn to genetic testing as a way of discovering their roots, it is becoming increasingly clear that characterizing the unique Y-DNA genetic signature of the historically significant rabbinical lineages with well-documented pedigrees, will play a critical role in the ultimate success of these endeavors. As Y-DNA genetic signatures are identified for a growing number of rabbinical lineages, and the number of families represented in the DNA databases increases, the likelihood of finding a match to a well-documented pedigree increases.[93]

Y-DNA research studies such as WIRTH,[94] Polonsky,[95] Bacharach,[96] and Wertheim-Giterman (Savran-Bendery Chassidic dynasty)[97] [98] have demonstrated the intrinsic value of characterizing rabbinic Y-DNA in an effort to bridge the major gaps in the paper trail for both Ashkenazi and Sephardic Jews.

With the successful identification and characterization of the Y-DNA genetic signature of the Katzenellenbogen rabbinical lineage, we hope to enable many current and future generations of previously unknown Jewish and Iberian descendants to connect themselves and their families to this illustrious rabbinical lineage, and to discover their remarkable lost heritage.

Appendix: The Illustrious Ancestry of the Katzenellenbogen Rabbinical Lineage

The Katzenellenbogen rabbinical lineage, which descends from Rabbi Meir *ben* (son of) Rabbi Isaac Katzenellenbogen, better known as the Maharam of Padua (c. 1482–1565), is a venerable and historically significant family with many thousands of descendants widely dispersed throughout Europe, Israel, and the United States.[99] The family derived its name from the locality of Katzenelnbogen in the Prussian province of Hesse-Nassau, now Germany.[100] [101]

Rabbi Meir Katzenellenbogen's son, Rabbi Samuel Judah (1521–1597), inherited his father's position as the head of the Padua yeshiva.[102] Rabbi Samuel Judah's son was Saul Wahl (c. 1541–1617), the Polish Court Jew and legendary "King of Poland for a day."[103] Saul had five sons and six daughters, who married into the leading families of East European Jewry.[104]

Members of the family intermarried with other prominent Jewish families (*e.g.*, Ashkenazi, Helperin, Horowitz, Luria, Mintz, Rappaport, Shapiro, and Teomim, among others), and produced many notable rabbis. Such was the fame of the Katzenellenbogen family that men who married Katzenellenbogen women typically adopted their wives' family surname.[105]

The list of notable descendants of the Katzenellenbogen lineage includes Rabbi Menachem Nachum Twersky of Chernobyl, Rabbi Abraham Joshua Heschel, Lord Immanuel Jakobovitz (Chief Rabbi of the British Empire), Martin Buber, Karl Marx, Moses and Felix Mendelssohn, Baron Guy de Rothschild, and Helena Rubenstein, among many others.

The founder of the lineage, Rabbi Meir Katzenellenbogen, was a great-grandson of Rabbi Aharon Luria, and thus a descendant of the venerable Luria lineage. According to Neil Rosenstein, "among families which claim descent from biblical King David, probably the one with the most authenticity is that of the Lurie family."[106] The Lurie family was foremost in the earliest adoption of surnames, a claim which was recorded in the 1999 U.S. edition of the *Guinness Book of Records*, under "Longest lineage."[107]

By virtue of Rabbi Aharon Luria's marriage to Miriam Spira, the daughter of Rabbi Solomon Spira, Rabbi Meir Katzenellenbogen also descends from the ancient and esteemed Shapiro rabbinical lineage, which traces its roots through the Treves rabbinical lineage, which claims descent from the famed biblical commentator Rabbi Solomon ben Yitzhak Tzarfati, better known as Rashi (1040 – 1105).

Rabbi Meir Katzenellenbogen married Hannah Mintz (1485 – 1564), the daughter of Rabbi Abraham Mintz (d. 1530), son of Rabbi Judah Mintz, head of the yeshiva of Padua, Italy. Judah ben Eliezer ha-Levi Mintz (c. 1405 – 1508), also known as *Mahari* Mintz, was the most prominent Italian rabbi of his time.[108] He officiated as rabbi of Padua for

forty-seven years, during which time he had a great number of pupils, among whom was Meir Katzenellenbogen.

Tombstones of Rabbi Samuel Judah Katzenellenbogen in the old Jewish cemetery in Padua, Italy (the tall tombstone against the back wall), and his father, Rabbi Meir Katzenellenbogen (partially obscured, to the immediate right of Samuel Judah's tombstone)[109]

Katzenellenbogen family crest showing detail of a crouching cat on top of Rabbi Samuel Judah Katzenellenbogen's tombstone.[110]

In the Siege of Padua soon after Rabbi Judah Mintz's death, almost all of his writings were destroyed. His grandson, Rabbi Joseph Mintz, discovered sixteen of his *responsa*,[111] and these were published in 1553, by Rabbi Meir Katzenellenbogen, who printed his own responsa in the same volume. In this document, Rabbi Meir Katzenellenbogen's name appears as "Meir *ben* (son of) Yitzhak Katzenellenbogen *mi* (of) Padua," along with his father-in-law Rabbi Abraham Mintz, and his grandfather-in-law, Rabbi Judah Mintz.[112]

Many Katzenellenbogen rabbis and descendants wrote *yichus* (pedigree) letters and books regarding their illustrious lineage. Many of these rabbinical sources are compiled in Dr. Neil Rosenstein's books on Saul Wahl Katzenellenbogen[113] and the Lurie lineage.[114] Several of the more well-known of these sources are presented here.

הא לכם זרע לצרקה פסקים

Rabbi Meir Katzenellenbogen Responsa, 1553 [See fn. 115]

In 1758, Rabbi Pinchas Katzenellenbogen (1691 – 1765), son of Rabbi Moses Katzenellenbogen (1670 – 1733), son of Rabbi Saul Katzenellenbogen (1617 – 1691), wrote a manuscript entitled: *The Book of Inheritance* about his genealogy back to Saul Wahl. The manuscript included the story about Saul Wahl serving as the King of Poland for one night.[116]

In 1797, Rabbi Naftali Hirsch Katzenellenbogen (1745 – 1828), son of Rabbi Eliezer (Lazarus) Katzenellenbogen (b. 1700), and 4th-great-grandson of Saul Wahl, wrote a book, *Sha'ar Naftali*, about his genealogy, in which he traces his descent from Rabbi Meir Katzenellenbogen through nine generations.[117][118]

In 1854, Rabbi Tzvi Hirsch Edelman (1805 – 1858) wrote a book about the genealogy of the Katzenellenbogen family entitled: *The Greatness of Saul Wahl*. In his book, he presents Rabbi Meir Katzenellenbogen's descent from Rashi through the Luria, Shapiro, and Treves lineages, and Rashi's descent from King David.[119]

In 1936, Rabbi Meir Ellenbogen (born Katzenellenbogen) (1865 – 1947) wrote a book entitled: *The Silver Thread*, about the Katzenellenbogen genealogy, which presented the entire lineage from Rashi to Rabbi Meir Katzenellenbogen, and his descendants, ending with himself.[120]

Thanks to the numerous published genealogies of the Katzenellenbogen family in rabbinical sources, family trees, and *yichus* letters, genealogists have reached a consensus

regarding the authenticity and validity of the Katzenellenbogen rabbinical lineage.[121]

Authors, Jeffrey Mark Paull & Neil Rosenstein, IAJGS Conference, Jerusalem, Israel, July, 2015

Two of the Katzenellenbogen Y-DNA research study authors descend from the Katzenellenbogen rabbinical lineage.

Lead author, Dr. Jeffrey Mark Paull, descends from the Katzenellenbogen lineage through the marriage of his 4th-great-grandfather, Rabbi Eliyahu Pinchas Polonsky, to Sima Wertheim, the daughter of Rabbi Aryeh Leib Wertheim. Sima's mother, Leah Wertheim, was the granddaughter of Rabbi Menachem Nachum Twersky of Chernobyl. Rabbi Twersky was a direct descendant of Rabbi Meir Katzenellenbogen, through his great-grandmother, Dinah Wahl Katzenellenbogen.

Dr. Neil Rosenstein descends from the Katzenellenbogen lineage through his grandmother, Sonya (Sarah) Katzenellenbogen, who married Boris (Baruch) Rosenstein. Sonya was a direct descendant of Rabbi Meir Katzenellenbogen's granddaughter, the wife of Rabbi Joel Ashkenazi, who acquired his wife's Katzenellenbogen surname.

Notes

[1] Arthur Kurzweil: "From Generation to Generation – How to Trace Your Jewish Genealogy and Family History." Jossey-Bass, A Wiley Imprint (2004), p. 196.

[2] Jewish Virtual Library: "Katzenellenbogen." Source: Encyclopedia Judaica. http://www.jewishvirtuallibrary.org/jsource/judaica/ejud_0002_0012_0_10863.html.

[3] Rabbi Reuven Ross: "Maharam Padua: The Life and Times of Rav Meir Katzenellenbogen (1482 – 1565)." https://books.google.com/books?id=v7O7BwAAQBAJ&dq=meir+katzenellenbogen+1482&source=gbs_navlinks_s.

[4] Jewish Encyclopedia.com: "Katzenellenbogen." http://www.jewishencyclopedia.com/articles/9238-katzen ellenbogen.

[5] Neil Rosenstein: "The Unbroken Chain: Biographical Sketches and Genealogy of Illustrious Jewish Families from the 15th-20th Century." Revised Edition. The Computer

Center for Jewish Genealogy, CIS Publishers, New York, NY, 1990. Dr. Rosenstein is planning to publish a new edition of *The Unbroken Chain* in 2016.

[6] Chaim Freedman: "The Rashi Descent." http://www.jewishgen.org/rabbinic/infofiles/rashi.htm. The author mentions the Katzenellenbogen rabbinical lineage as one of "a core of medieval rabbinical families who were descended from Rashi," and which "comprise the root from which most other rabbinical families stemmed."

[7] Rabbi Reuven Ross: "Maharam Padua." *Op cit.* In regard to the Katzenellenbogen family, the author states: "The family could trace its roots back to Rashi and further still to Dovid HaMelech and it is estimated that at least fifty per cent of Ashkenazi Jewry today are descendants of this royal lineage."

[8] Jewish Virtual Library: "Katzenellenbogen." *Op cit.*

[9] Neil Rosenstein: "Katzenellenbogen Lineage Question." Email communication with Jeffrey Mark Paull, February 22, 2015. In regard to the accuracy and authenticity of the Katzenellenbogen rabbinical lineage, particularly for the first six generations from Rabbi Meir Katzenellenbogen (1482 – 1565) to Rabbi Saul Katzenellenbogen (1617 – 1691), Neil Rosenstein stated: "The paper trail of that period is solid. All sources, books, manuscripts, epitaphs, etc. leave no doubts."

[10] Chaim Freedman: "The Rashi Descent." *Op cit.*

[11] There are ongoing debates among scholars regarding inconsistencies in the lineage between Rashi (1040 –1105) and Rabbi Joseph Treves (c. 1305 – 1370). For example, Neil Rosenstein, in his book, "The Lurie Legacy," cites a gap of "7 to 8 generations between Rashi and Joseph Treves." While acknowledging that there are uncertainties in the early generations descending from Rashi that may never be adequately resolved, we believe that it is important to present the currently available published genealogical information, even though it may not be from primary sources. The lineage that we present in Figure 1, and its sources are documented in our Katzenellenbogen Rabbinical Lineage family tree, and posted on Ancestry.com: http://trees.ancestry.com/tree/88431732/family.

[12] Edward Gelles: "The Jewish Journey: A Passage Through European History." I.B. Tauris & Company Ltd., London, 2016, p. 16.

[13] Neil Rosenstein: "The Unbroken Chain." *Op cit.*

[14] Neil Rosenstein: Email communication with Jeffrey Briskman, February 23, 2015. David Kellen's lineage was based on information from Neil Rosenstein's newly revised edition of *The Unbroken Chain* (pre-publication draft). According to this information David's line descends from Meir Katzenellenbogen (born after 1630), who was the brother of Rabbi Saul Katzenellenbogen (1617 – 1691). There is some uncertainty regarding the unnamed paternal ancestor between Jacob Katzenellenbogen (c. 1720 – 1761) and Meir Katzenellenbogen (born c. 1770).

[15] The primary source for the lineage information presented in Table 1 is *The Unbroken Chain*, pp. 92-95, and 112-119. Additional genealogical sources, including immigration, census, and obituary records, as well as internet search resources and personal communications were utilized to locate living descendants of these lineages.

[16] The abbreviation ABD stands for *Av Beit Din*, the Hebrew term for head of the rabbinical court.

[17] Meir Ellenbogen: "The Silver Thread," *Op cit.*

[18] Aaron Walden: "*Shem ha-Gedolim he-Ḥadash.*" Warsaw, Poland, 1864, p. 59. The author mentions Nachum of Slutsk as the son-in-law of Saul Wahl Katzenellenbogen's grandson.

[19] Neil Rosenstein: "Katzenellenbogen Lineage." Email correspondence with Jeffrey Mark Paull, February 19, 2015.

[20] Graham de Vahl Davis: "My Grandfather Was a Ghost." Email correspondence from Neil Rosenstein to Jeffrey Mark Paull, February 21, 2015.

[21] Tatyana Tsenter (Viktor Katsenelenbogen's daughter): Russian website *Odnoklassniki* (Classmates), www.ok.ru. Instant text communication with Jeffrey Briskman, October 1, 2014.

[22] Family Tree DNA Learning Center: "What does each short tandem repeat (STR) marker mean?" https://www.familytreedna.com/learn/y-dna-testing/y-str/short-tandem-repeat-str-marker-mean/.

[23] Rabbi Yaakov Kleiman: "The DNA Chain of Tradition: The Discovery of the "Cohen Gene." http://www.cohen-levi.org/jewish_genes_and_genealogy/the_dna_chain_of_tradition.htm.

[24] Wikipedia: "Haplogroup." https://en.wikipedia.org/wiki/Haplogroup. A haplogroup is comprised of similar haplotypes that share a common ancestor having the same single nucleotide polymorphism (SNP) mutation in all haplotypes. In human genetics, the haplogroups most commonly studied are Y-chromosome (Y-DNA) haplogroups and mitochondrial DNA (mtDNA) haplogroups, both of which can be used to define genetic populations. The special feature that both Y chromosomes and mtDNA display is that mutations can accrue along a certain chromosome segment and these mutations remain fixed in place on the DNA. Furthermore, the historical sequence of these mutations can also be inferred.

[25] ISOGG defines the term "genetic signature" as: "Another name for a haplotype," a Y-DNA haplotype being the numbered results of a genealogical Y-DNA STR test. http://isogg.org/wiki/Genetics_Glossary. FTDNA defines it similarly. https://www.familytreedna.com/learn/y-dna-testing/. In our view, the haplogroup, defined by the terminal single nucleotide polymorphism (SNP) that is shared by members of the haplogroup, is also an essential part of the Y-DNA genetic signature of a particular paternal lineage; STR and SNP results are complementary, and most powerful when used in tandem.

[26] Tatyana Tsenter: Email correspondence with Jeffrey Briskman, May 1, 2015.

[27] Xico Garcia initially appeared on the genetic match lists of all three pedigreed Katzenellenbogen descendants. He later dropped off their match lists, although he remained on the match list of Viktor Katsenelenbogen. His Y-DNA results are included in Table 4 because his allele values match the haplotype of the pedigreed Katzenellenbogen descendants as closely as those of the other Iberian descendants. His recent omission from their genetic match lists may simply be an artifact of FTDNA's match list reporting system.

[28] The haplotype is represented by the matching ancestral allele values and the possible ancestral allele values (indicated by the green shaded cells) in Tables 2, 3, and 4.

[29] The J-YSC0000076 haplogroup is a subclade of the J-M267 haplogroup, and J-L823 is a subclade of J-YSC0000076. Identification of the J-L823 subclade requires a single nucleotide polymorphism (SNP) test.

[30] Wikipedia: "Sephardi Jews." https://en.wikipedia.org/wiki/Sephardi_Jews. Sephardi Jews, also known as Sephardic Jews or Sephardim (Hebrew for "The Jews of Spain"), are a Jewish ethnic division whose ethnogenesis and emergence as a distinct community of Jews coalesced in the Iberian Peninsula around the 10th century. They established communities throughout Spain and Portugal, evolving what would become their distinctive characteristics and diasporic identity. Their residence as an organized Jewish community

in Iberia was brought to an end starting with the Alhambra Decree by Spain's Catholic Monarchs in the late 15th century, which resulted in a combination of migrations, expulsions, mass conversions, and executions.

[31] Joshua Teplitsky: "The Sephardic Diaspora After 1492." http://www.myjewishlearning.com/article/the-sephardic-diaspora-after-1492/2/.

[32] A TMRCA prediction could not be calculated for the fifth Iberian descendant, Xico Garcia, using FTDNA's time predictor (TiP®) model, because he does not currently appear on the genetic match lists of the pedigreed Katzenellenbogen descendants (see note #27 above).

[33] Rachel Unkefer: "Interpreting Y-DNA Markers: A Primer." AVOTAYNU: The International Review of Jewish Genealogy, Vol. XXX, No. 1, Spring 2014. Using McGee Utilities to calculate TMRCAs, the author reported: "In situations with known family trees, the number of generations back to the known MRCA tends to be smaller (more recent) than the 95 percent probability prediction in the vast majority of cases we have studied. The actual documented TMRCA usually falls between the 50 percent probability predictions and the 95 percent probability predictions."

[34] Jeffrey Mark Paull: "Connecting to the Great Rabbinic Families through Y-DNA: A Case Study of the Polonsky Rabbinical Lineage." AVOTAYNU: The International Review of Jewish Genealogy, Vol. XXIX, No. 3, Fall, 2013. Using FTDNA's time predictor model, the author found that the actual TMRCA fell between the 58.6 percent and 89.5 percent probability predictions.

[35] Jeffrey Mark Paull and Jeffrey Briskman: "Connecting to the Great Rabbinic Families through Y-DNA: The Savran-Bendery Chassidic Dynasty." Using FTDNA's time predictor model, the authors found that the actual TMRCA fell between the 53.8 percent and 93.3 percent probability predictions.

[36] Rachel Unkefer, "Interpreting Y-DNA Markers: A Primer." *Op cit.*, 2014.

[37] Meir Katzenellenbogen was known to have had a brother, Moses, who lived in Prague (see notes #39 and #40 below).

[38] Dr. Abraham Joshua Twerski (b. 1930) is a known maternal descendant of Rabbi Menachem Nachum Twersky (1730 – 1797). Abraham's paternal ancestor, Rabbi Mordechai Dov, was the son of Menachem Nachum's great-granddaughter, Sterna Rachel Auerbach (nee Twerski), and acquired her Twerski maiden surname. Surprisingly, however, Abraham's Y-DNA results matched those of the Twersky rabbinical dynasty,

thereby implying that the Auerbach and Twersky rabbinical lineages share a common paternal ancestor.

[39] Neil Rosenstein: "Saul Wahl: Polish King for a Night or Lithuanian Knight for a Lifetime." The Computer Center for Jewish Genealogy, Elizabeth, NJ, 2006, p. 3. Rosenstein refers to a book called "Die Familien Prags" (1892) by Simon Hock, which mentions Moses (d. 1540), son of Isaac Katzenellenbogen, whom Rosenstein considers as "most likely a brother of Meir [Katzenellenbogen] of Padua [Italy]." Hock also records other Katzenellenbogen family deaths in Prague in 1634. This implies that after Meir Katzenellenbogen moved to Padua, some other Katzenellenbogen families stayed in Prague. Viktor Katsenelenbogen could be a descendant of one of those Katzenellenbogen families.

[40] Meir Wunder: "*Elef Margaliot*." *ha-Makhon le-hantsaḥat Yahadut Galitsyah*, Publisher, Jerusalem, Israel, 1993, p. 188. According to this second source, Rabbi Isaac Katzenellenbogen left Germany and moved to Prague with his family. His son Moses, brother of Meir Katzenellenbogen, died there and was buried in the Prague Jewish cemetery. This source corroborates that there was another non-rabbinical branch of the Katzenellenbogen family who remained in Prague, and who descended from the same common ancestor as Meir Katzenellenbogen.

[41] The FTDNA time predictor (TiP®) model calculations for Figure 6 are based on a comparison of newly-identified Jewish descendants with pedigreed Katzenellenbogen descendant David Kellen, at 67 STR markers.

[42] SephardicGen Resources: Consolidated Index of Sephardic Surnames. http://www.sephardicgen.com/ databases/indexSrchFrm.html. Garcia, Marquez, and Romero are very common Iberian surnames, and their listing in this index of Sephardic surnames is not meant to imply that all individuals with these surnames are of *converso* ancestry.

[43] Wikipedia: "Converso." https://en.wikipedia.org/wiki/Converso. A *converso* (from Latin *conversvs*, for "converted, turned around") and its feminine form *conversa*, was a Sephardic Jew who converted to Catholicism in Spain or Portugal, particularly during the 14th and 15th centuries, or one of their descendants. The remaining Jews who had not converted were finally expelled from Spain in 1492, and a significant portion of them who chose to convert to Catholicism were subject to discriminatory laws and harassment by the Inquisition. New Christians of Jewish origin were referred to as *marranos*. The term *marrano* may also refer to Crypto-Jews or those who secretly continued to practice Judaism.

[44] The vast majority of Ashkenazi Jews do not know their ancestry going back more than a few generations. Hence, they report their ancestry as being Ashkenazi by default,

because they are unaware that they may have a Sephardic ethnic origin.

[45] FTDNA: "Y-DNA Genetic Distance." https://www.familytreedna.com/learn/y-dna-testing/y-str/genetic-distance/. "When talking about two or more Y-chromosome STR (short tandem repeat) haplotypes, genetic distance is the total number of differences or mutations between two sets of results. In general, it is found by summing the differences between each STR marker."

[46] Wikipedia: "Anusim." https://en.wikipedia.org/wiki/Anusim. Anusim, meaning coerced or converted Jews, is a legal category of Jews in halakha (Jewish law) who were forced to abandon Judaism against their will, typically while forcibly converted to another religion.

[47] Manuel Tenorio: Email correspondence with Judy Simon, June 3, 2015. Mr. Tenorio wrote: "The answer to your question is yes. My grandparents and great-grand parents practiced their Jewish religion in secret. They were devout Catholics and pillars of the Church; however, secretly, they practiced their Jewish Faith in secret in a small windowless room that they lit with candles."

[48] Because all newly-identified Iberian Katzenellenbogen genetic matches (KGMs) appear only on David Kellen's Y-DNA genetic match list at the 67 STR marker level, he was selected to represent the pedigreed Katzenellenbogen descendants for the purpose of utilizing the FTDNA time predictor model.

[49] Wim Penninx: "Katzenellenbogen Y-DNA Study." Email correspondence with Jeffrey Mark Paull, February 21, 2016. Wim has expressed reservations regarding the accuracy of FTDNA's time predictor (TiP) model, especially in the 15 – 20 generation range. On the basis of his analysis of the genealogical data, including the J-L823 SNP, he is of the opinion that the MRCA for the pedigreed Katzenellenbogen descendants and their Iberian genetic matches predates the founding of the Katzenellenbogen rabbinical lineage. While we certainly acknowledge this possibility, and present it as one of several possible scenarios in our article, we do not believe that either STR mutation-rate based models, such as the TiP model, or phylogenetic-based methods are currently accurate enough to make this determination with a high degree of scientific certainty.

[50] Jewish Encyclopedia: "Katzenellenbogen." http://www.jewishencyclopedia.com/articles/9238-katzenellenbogen. According to this source, "the Katzenellenbogen surname is sometimes used in conjunction with the Ashkenazi epithet."

[51] Manuel Tenorio: *Op cit.*

[52] Miguel Torrez: Email correspondence with Jeffrey Mark Paull, January 28, 2016. According to Mr. Torrez: "So, it appears that these two families have a connection prior to the re-conquest of NM in 1692. Is the connection in Mexico or in Spain; I am not sure and think a lot more will need be done to analyze the possibilities. There is still a chance that a Tenorio fathered the Romero line in the early 1700s since YDNA confirms the legitimacy of the Romero line back to 1730s without a doubt via Daniel Romero and Eddy Romero YDNA match and genealogies."

[53] Although Middle Eastern and Northern African ethnic components are consistent with Sephardic ethnic ancestry, differences in ethnic admixture between Ashkenazi and Sephardic Jews have not been well-defined, and even less is known regarding ethnic admixture for *converso* populations. This is a promising new area for future research.

[54] Jeffrey Mark Paull and Janet Billstein Akaha: "Using Autosomal DNA Analysis to Connect Rabbinical Lineages: A Case Study of the Wertheimer and Wertheim Dynasties." AVOTAYNU Volume XXVIII, Number 4, Winter 2012.

[55] Jeffrey Mark Paull, Gaye Sherman Tannenbaum, and Jeffrey Briskman: "Differences in Autosomal DNA Characteristics between Jewish and Non-Jewish Populations." Surname DNA Journal, published July 31, 2014.

[56] Jeffrey Mark Paull, Gaye Sherman Tannenbaum, and Jeffrey Briskman: "Why Autosomal DNA Test Results Are Significantly Different for Ashkenazi Jews." AVOTAYNU Volume XXX, Number 1, Spring 2014.

[57] Brian Selwyn: Verbal communication with Jeffrey Mark Paull, October 8, 2014.

[58] Tatyana Katsenelenbogen: Email correspondence with Jeffrey Briskman, October 1, 2014.

[59] Richard Dahl: Email correspondence with Jeffrey Mark Paull, May 30, 2015. According to Richard: "There is no oral tradition of rabbinical descent, but there is an oral tradition of Spanish origin. The family has been Dahl since the French occupation of Germany."

[60] Wikipedia: "Haplogroup." http://en.wikipedia.org/wiki/Haplogroup. A haplogroup is a group of similar haplotypes that share a common ancestor having the same single nucleotide polymorphism (SNP) mutation in all haplotypes.

[61] Family Tree DNA: "J1 Y-DNA Project." https://www.familytreedna.com/public/J-M267/.

[62] Wikipedia: "Haplogroup J-M267." http://en.wikipedia.org/wiki/Haplogroup_J-M267.

[63] Wikipedia: "Y-Chromosomal Aaron." http://en.wikipedia.org/wiki/Y-chromosomal_Aaron.

[64] Michael F. Hammer, Doron M. Behar, *et al.*: "Extended Y chromosome haplotypes resolve multiple and unique lineages of the Jewish priesthood." Human Genetics 126 (5): 707–717 (2009).

[65] The authors are currently researching the ancient Rappaport-Cohen rabbinical lineage, which they have identified as belonging to the J-M267 haplogroup.

[66] Victar Mas: Email correspondence with Jeffrey Mark Paull, September 20, 2015. FTDNA J1 project administrator, Victar Mas, responded to our question regarding the J-L823 SNP as follows: "If you look at the J1 project, you'll see we have Spanish kits in Cluster E. The surnames include Echeverria, Tenorio, Santafe, and Garcia, to name those that are in the project. We know J-L823 is Jewish, so either they were *Conversos* or Crypto-Jews that lost their Jewish identity through time."

[67] Judy Simon: Email correspondence with Jeffrey Mark Paull, June 5, 2015. FTDNA Iberian Ashkenaz project co-administrator, Judy Simon concluded: "The DNA has established the fact that there are Sephardim/conversos on the L823 paternal line."

[68] Bennett Greenspan: "Which SNPs to Test for the Katzenellenbogen Lineage." Email correspondence with Jeffrey Mark Paull, May 28, 2015. Bennett responded to our question regarding which SNPs would be most useful to test the Katzenellenbogen descendants for as follows: "YCS000076 is shared by lots of Jews and Arabs. Ideally we would look for a more downstream SNP. The SNP should be referred to as: J-L823. I would use that specific gene."

[69] Wim Penninx: "J-L823 Haplogroup." Email correspondence with Jeffrey Mark Paull, February 9, 2016.

[70] Wikipedia: "Phylogenetics." https://en.wikipedia.org/wiki/Phylogenetics. Phylogenetics is the study of the evolutionary history and relationships among individuals, species, or populations. These relationships are discovered through phylogenetic inference methods that evaluate observed heritable traits, such as DNA sequences (*e.g.*, SNPs) or morphology under a model of evolution of these traits. The result of these analyses is a phylogeny (also known as a phylogenetic tree) – a hypothesis about the history of evolutionary relationships. Phylogenetic analyses have become central to understanding biodiversity, evolution, ecology, and genomes.

[71] Jeffrey Mark Paull, Neil Rosenstein, and Jeffrey Briskman: "The Y-DNA Signature of the Katzenellenbogen Rabbinical Lineage – Research Update and Preliminary Findings" (2014). https://independent.academia.edu/JeffreyMarkPaull.

[72] Wim Penninx: "Katzenellenbogen Y-DNA Study." Email correspondence with Jeffrey Mark Paull, February 15, 2016. In this email message, Wim Penninx stated: "I agree with the three scenarios."

[73] The newly-identified Iberian and Jewish Katzenellenbogen genetic matches could descend from a cousinly line of Meir Katzenellenbogen. There is historical evidence for the existence of such a cousinly Katzenellenbogen line who lived in Prague contemporaneously with Meir's branch (see notes #39 and #40 above).

[74] Joshua Teplitsky: "The Sephardic Diaspora After 1492." *Op cit*.

[75] This is the explanation that is favored by Wim Penninx (see note #49 above).

[76] Rachel Unkefer*:* "Interpreting Y-DNA Markers: A Primer." *Op cit*., 2014.

[77] Rabbi Reuven Ross: "Maharam Padua." *Op cit*. The author presented the following genealogical information regarding Meir Katzenellenbogen: "Born in the town of Katzenellenbogen Germany in 1482, from where the family took its name, his father Rav Yitzhak was a Torah scholar of great repute and is quoted in various Halachic works under the title *Mahari*. The family could trace its roots back to Rashi and further still to Dovid HaMelech, and it is estimated that at least fifty percent of Ashkenazi Jewry today are descendants of this royal lineage."

[78] Jewish Encyclopedia.com: "Katzenellenbogen (more correctly Katzenelnbogen, sometimes with the epithet Ashkenazi)." http://www.jewishencyclopedia.com/articles/9238-katzenellenbogen.

[79] In this regard, it is important to note that although Meir Katzenellenbogen was born in Germany, it is not known where his father, Rav Yitzchak (Isaac) was born.

[80] JewishHistory.org: "The Marranos." http://www.jewishhistory.org/the-marranos/.

[81] Ibid. According to this source: "The most famous Jew to flee Spain was Don Isaac Abarbanel (also spelled Abravanel). His presence in Italy gave standing to the Spanish Jews, who rose rapidly to positions of wealth and influence … Around the same time the Abarbanel arrived, a great rabbi from Poland settled in the town of Padua, Rabbi Meir ben Isaac Katzenellenbogen."

[82] Neil Rosenstein: Email correspondence with Jeffrey Mark Paull, June 5, 2015. According to Dr. Rosenstein: "It has been well-known that a number of major rabbinical families have a long-standing tradition that they descend from pre-Inquisition Spain and Portugal. This is also borne out by scholars such as Rabbi Beryl Wein and Sir Martin Gilbert."

[83] Meir Wunder: "*Elef Margaliot*." *Op cit*, p. 47-48. This source presents the family tree of Rabbi Aharon ben Yosef ha-Levi, the progenitor of the Epstein family, and his brother, Rabbi Pinchas ben Yosef ha-Levi, the progenitor of the Horowitz family. These brothers are the direct male descendants of Rabbi Zerahyah ben Yitzhak ha-Levi Gerondi (1125-1186).

[84] Tzvi ha-Levi Ish Horowitz: "Legacy of Horowitz Family: First Generations." M. Lenkowicza, Krakow, Poland, 1929. The author provides the family tree of brothers Pinchas and Aharon from Barcelona, sons of Yosef ha-Levi who was the paternal descendant of Yitzhak ha-Levi Gerondi. The author also tells the story of how the descendants of Pinchas came to Bohemia and acquired their Horowitz surname.

[85] Baruch ha-Levi Epstein: "*Makor Baruch*." Ram Publishing, Vilna, Lithuania, 1928, pp. 3; 54-55. The author states that he is a descendant of the Sephardic family known as Benveneshti, and that he is also a descendant of the author of "*Ha-Maor*" (Zerahyah ben Yitzhak ha-Levi Gerondi). He also mentions the change of the family's surname from Benveneshti to Epstein, when they emigrated from Spain to Germany.

[86] Wim Penninx: "Katzenellenbogen Y-DNA Study." Email correspondence with Jeffrey Mark Paull, February 21, 2016. In a dissenting view, Wim Penninx sees no strong argument for the Iberian ethnic origin of the Epstein-Horowitz line. He points out that Horowitz is probably part of the R1a haplogroup, which has no indication of Iberian lines as of yet. He also points out that the Epstein surname is present in many Y-DNA branches, and that it is clear that the name was given without reference to a single paternal line.

[87] JewishHistory.org: "The Marranos." *Op cit*. According to this source: "Rabbi Meir ben Isaac Katzenellenbogen had three sons: a rabbi, a banker and a merchant. They befriended Italian noblemen scattered among the fractured states of the Italian peninsula and created a base for Jewish life for the future. Rabbi Katzenellenbogen and his sons fathered a great number of descendants."

[88] Jeffrey Mark Paull and Jeffrey Briskman: "The History, Adoption, and Regulation of Jewish Surnames in the Russian Empire – A Review." AVOTAYNU: The International Review of Jewish Genealogy, Fall, 2014.

[89] Tatyana Tsenter: Email communication with Jeffrey Briskman, May 1, 2015. Viktor Katsenelenbogen's daughter said of her father: "He was told that his ancestors were famous rabbis. But that's all that he knew. No papers left, no records of any of it. Exactly one year ago, I was thinking of a birthday present for my father, and decided to order a Y-DNA test from Family Tree DNA to find more information about the last name that my father was so loyal and dedicated to. My father is the last one who carries this last name in our family. I am his only daughter, but my two sons know where they came from and are very proud of it now."

[90] Bennett Greenspan: "Genetic Genealogy: History and Current Issues." AVOTAYNU, Volume XXX, No. 2, Summer 2014.

[91] Bennett Greenspan: Email correspondence with Jeffrey Mark Paull, September 17, 2014. Quoting Bennett: "I'd be blown away if I came from a famous rabbinic family."

[92] Neil Rosenstein: "The Unbroken Chain." *Op cit*., p. 12. In regard to Nachum of Slutsk, Dr. Rosenstein states: "Various sources seem to be uncertain of the fact whether or not he was the son or the son-in-law of Meir."

[93] Rachel Unkefer: "From Kansas to the Rhine: A DNA Journey through Europe's Rabbinic Capitals." AVOTAYNU: The International Review of Jewish Genealogy, Vol. XXIX, No. 4, Winter 2013.

[94] Herbert Huebscher and Elise Friedman: "DNA and Jewish Genealogy Join Forces." AVOTAYNU: The International Review of Jewish Genealogy, Vol. XXIII, No. 2, Summer 2007.

[95] Jeffrey Mark Paull: "Connecting to the Great Rabbinic Families through Y-DNA: A Case Study of the Polonsky Rabbinical Lineage." AVOTAYNU: The International Review of Jewish Genealogy, Vol. XXIX, No. 3, Fall, 2013.

[96] Rachel Unkefer: "From Kansas to the Rhine: A DNA Journey through Europe's Rabbinic Capitals." *Op cit*., 2013.

[97] Jeffrey Mark Paull and Jeffrey Briskman: "Y-DNA Genetic Signature of the Savran-Bendery Chassidic Dynasty." Surname DNA Journal, May 31, 2015.

[98] Jeffrey Mark Paull and Jeffrey Briskman: "Connecting to the Wertheim-Giterman Rabbinical Lineage through Y-DNA." AVOTAYNU: The International Review of Jewish Genealogy, Volume XXX, Number 3, Fall 2014.

[99] Jewish Virtual Library: "Katzenellenbogen." Source: Encyclopedia Judaica. http://www.jewish virtuallibrary.org/jsource/judaica/ejud_0002_0012_0_10863.html.

[100] Rabbi Reuven Ross: "Maharam Padua: The Life and Times of Rav Meir Katzenellenbogen (1482 – 1565)." https://books.google.com/books?id=v7O7BwAAQBAJ&dq=meir+katzenellenbogen+1482&source=gbs_navlinks_s.

[101] Jewish Encyclopedia.com: "Katzenellenbogen." http://www.jewishencyclopedia.com/articles/9238-katzenellenbogen.

[102] Wikipedia: "Yeshiva." http://www.en.wikipedia.org/wiki/Yeshiva. A yeshiva is a Jewish institution that focuses on the study of traditional religious texts, primarily Talmud and Torah study.

[103] Neil Rosenstein: Saul Wahl: "Polish King for a Night or Lithuanian Knight for a Lifetime." *Op cit*.

[104] Neil Rosenstein: "The Children and Grandchildren of Saul Wahl." Email correspondence with Jeffrey Mark Paull, February 11, 2015.

[105] Jewish Virtual Library: "Katzenellenbogen." *Op cit*.

[106] Neil Rosenstein: "The Lurie Legacy: The House of Davidic Royal Descent." Avotaynu Inc., Bergenfield, NJ, 2004, p. xxi. (The Lurie surname includes spelling variants Loria and Luria).

[107] Ibid.

[108] Wikipedia: "Judah Minz." http://en.wikipedia.org/wiki/Judah_Minz.

[109] Photograph of Padua cemetery and Katzenellenbogen tombstones provided courtesy of Neil Rosenstein, who photographed the cemetery in January, 1968.

[110] Ibid.

[111] Wikipedia: "Responsa." https://en.wikipedia.org/wiki/Responsa. Responsa (Latin: plural of *responsum*, "answers") comprise a body of written decisions and rulings given by legal scholars in response to questions addressed to them. In the modern era, the term is used to describe decisions and rulings made by scholars in historic religious law.

[112] Rabbi Meir Katzenellenbogen and Rabbi Judah Mintz: "*Sheelot u-Tshuvut* (Questions and Answers)." Aluise Bragadini Publisher, Venice, 1553.

[113] Neil Rosenstein: Saul Wahl: "Polish King for a Night or Lithuanian Knight for a Lifetime." *Op cit*.

[114] Neil Rosenstein: "The Lurie Legacy." *Op cit*.

[115] Rabbi Meir Katzenellenbogen and Rabbi Judah Mintz: "*Sheelot u-Tshuvut* (Questions and Answers)." *Op Cit*. The photo of the cover page the book, which was published in 1553, is in the public domain.

[116] Rabbi Pinchas Katzenellenbogen: "*Sefer Yesh Mankhilin*" (Book of Inheritance). Unpublished manuscript from 1758, published by Makhon Hatam Sofer, Jerusalem, 1986.

[117] Naphtali Hirsch Katzenellenbogen: "Sha'ar Naftali." Frankfort-on-the-Oder, 1797.

[118] Jewish Encyclopedia: "Katzenellenbogen." 1906. http://www.jewishencyclopedia.com/articles/9238-katzenellenbogen#anchor16. The Jewish Encyclopedia presents the Katzenellenbogen lineage, as presented in Naphtali Hirsch Katzenellenbogen's book: "Sha'ar Naftali."

[119] Rabbi Tzvi Hirsch Edelman: "*Gedulat Shaul* (The Greatness of Saul Wahl)." Shaw Publishing Co., London, 1854.

[120] Meir Ellenbogen: "The Silver Thread: Record of the Katzenelenbogen (*sic*) Family, including Mintz, Lurie, Teumim (*sic*), Samuel, and Greenberg." Moinester Publishing Co., Brooklyn, NY, 1937.

[121] Neil Rosenstein: "Katzenellenbogen Lineage Question." *Op cit*.

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About Jeffrey Mark Paull

Dr. Jeffrey Mark Paull was born and raised in Pittsburgh, PA. He earned his BS in Chemistry and Master of Science in Industrial Hygiene from the University of Pittsburgh, and his MPH and Doctorate of Public Health from the Johns Hopkins University Bloomberg School of Public Health. Dr. Paull's career as an environmental toxicologist and scientific expert in the field of occupational and environmental health spans over thirty years (1976 – 2008).

Since that time, Dr. Paull has devoted himself to his passion for Jewish genealogical research and writing. His first book, entitled: A Noble Heritage: The History and Legacy of the Polonsky and Paull Family in America, traces his family's ancestry over a millennium of history, and discovers their lost rabbinical heritage dating back to Rashi (1040 – 1105). His book was recently featured on the PBS website, "Finding your Roots, with Henry Louis Gates, Jr."

Dr. Paull is very active in the field of genetic genealogy, and has published numerous pioneering autosomal and Y-DNA studies in which he has identified the unique Y-DNA genetic signature of some of Eastern Europe's most renowned tzaddiks, rabbinical lineages, and Chassidic dynasties,

including the Katzenellenbogen and Polonsky rabbinical lineages, the Twersky and Savran-Bendery Chassidic dynasties, and the Shpoler Zeida's lineage. Research studies to identify the Y-DNA genetic signature of the Baal Shem Tov, Rabbi Levi Yitzhak of Berdichev, Rabbi Raphael of Bershad, Rabbi Yehuda Kahana of Sighet, and the Rappaport-Cohen, and Shapiro rabbinical lineages are currently underway.

Dr. Paull's many genealogy-related book chapters, research articles, and publications have surpassed 16,000 views, placing him in the top one percent of all researchers on Academia.edu. More in-depth information regarding Dr. Paull's books, and related genealogy and family history projects, may also be found on his Noble Heritage Facebook page: https://www.facebook.com/ANobleHeritage.

About Neil Rosenstein

Dr. Neil Rosenstein was born in Cape Town, South Africa. He studied medicine at the University of Cape Town and interned in Israel. He specialized in surgery at the Mt. Sinai hospitals in Cleveland and New York City, and the University of Medicine and Dentistry in Newark, NJ. He maintained a private practice as a general surgeon in New Jersey for over 30 years.

Dr. Rosenstein has accumulated a vast matrix of material on Jewish genealogy, especially in the field of rabbinical dynasties, and is the author of many works on Jewish Genealogy, his magnum opus being The Unbroken Chain. Other noted works include Saul Wahl, The Grandees of New Jersey, The Lurie Legacy: The House of Davidic Royal Descent, Avnei Zikaron (Stones of

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Dr. Rosenstein founded the Jewish Genealogical Society, Inc. (New York) in 1977, and is also founder and director of the Computer Center for Jewish Genealogy. In addition, he is contributor of articles to various Jewish genealogical publications and The Jewish Press. He lectures frequently and has spoken many times to various Jewish genealogical societies in the United States and abroad, as well as at the International Seminars for Jewish Genealogy and the annual National Summer Seminars. His biography is included in Who's Who in World Jewry (1987) and is listed in Marquis' Who's Who in America (from 1997 on).

About Jeffrey Briskman

Dr. Jeffrey Briskman was born and raised in Kursk, Russia. He attended Kursk State Technical University, Ben-Gurion University of the Negev in Beersheba, Israel, and Rutgers University, in New Brunswick, NJ, from which he holds a Doctorate in Pharmacy. Dr. Briskman is fluent in Russian and Hebrew, has obtained and translated hundreds of Russian census documents and vital records, and has contributed to numerous independent and JewishGen genealogical research projects. In addition to his collaboration with Dr. Paull on many pioneering genetic genealogy research studies, he is co-authoring their forthcoming book: God on Trial: The Life, Legends, and Descendants of the Shpoler Zeida.

COMMENTS